RED ONE™ CAMERA: OPERATIONS GUIDE

(Firmware Build 17, Version 3.4.1)

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1. Before you start.

Congratulations on your purchase of a RED ONE™ camera. Please read the attached safety instructions, then carefully unpack the camera body any accessories. If there is any physical damage to your camera or accessories, please file a support ticket at www.red.com/support.

RED ONE™ ™ Digital Cinema

IMPORTANT INFORMATION—READ BEFORE USING YOUR CAMERA

GENERAL USE.

DO NOT MODIFY OR DISMANTLE: Do not attempt to open your camera, lens or other accessory as doing so may expose you to electric shock and serious injury. There are no user-serviceable parts inside. Alteration or repairs made to the camera, lens or other accessory, except by a RED authorized service facility, will void the Limited Warranty. Users are not permitted to make design changes or otherwise modify the operation of the camera, lenses or other accessories, without the express written approval of RED Digital Cinema.

STORAGE: Store in a protected, level and ventilated place. Avoid exposure to temperature extremes, damp, severe vibration, strong magnetic fields, direct sunlight or local heat sources during storage. Remove any batteries from the camera before storage.

Note that storing batteries fully charged or in high temperature conditions may permanently reduce the life of the battery. Available battery capacity may also be temporarily lessened after storage in low temperature conditions.

The recommended storage and usage temperatures for your camera, lenses and other accessories are:

Operating range: 0C to +40C (32F to 104F)

Storage range: -20C to +50C (-4F to 122F)

If there are any performance issues with your camera or accessories within this operating range, please file a support ticket on www.red.com/support.

MOISTURE: Avoid exposing your camera to moisture. The unit is not waterproof, so contact with water could cause permanent damage to the unit as well as electric shock and serious injury to the user. Do not use the camera in the rain or under other conditions with high moisture and immediately remove the power source if exposed to moisture.

AVOID SHOCK: Do not expose your camera to excessive vibration or impact. Be careful not to drop your camera. Internal mechanisms may be damaged by severe shock. Mechanical alignment of optical elements may be affected by excessive vibration.

CLEANING: When cleaning your camera, remember that it is not waterproof and moisture can damage electronic circuitry. Do not rinse or immerse any element of the camera, lens or other accessory, keep them dry at all times. Do not use soaps, detergents, ammonia, alkaline cleaners, and abrasive cleaning compounds or solvents. These substances may damage lens coatings and electronic circuitry.

LASER BEAMS.
Avoid imaging of laser beams as they may cause damage to the sensor.

BATTERY.
Lithium Ion batteries may be subject to special handling requirements pursuant to federal and local laws. Please refer to specific shipping instructions included with your battery regarding proper transport of your battery. Do not handle your battery if it is damaged or leaking. Disposal of batteries must be in accordance with local environmental regulations. For example, California law requires that all rechargeable batteries must be recycled by an authorized recycle center.

ELECTROMAGNETIC INTERFERENCE.
The use of devices using radio or other communication waves may result in the malfunction or interference with the unit and/or with audio and video signals.

FCC RULES.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to proved reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference, in which case, the user will be responsible for correcting the interference at the user's own expense.

2. Camera Assembly

Connect the power cable from the Battery Plate, RED-CHARGER or AC Power Adaptor to the DC input on the rear of the camera body.

The RED-LCD and RED--EVF viewfinder may be mounted to the camera body using a short or extended length RED ARM. Attach the RED ARM to the camera body using the shorter threaded screw. There are attachment points on the camera body and on the RED RAIL TOP BRACKET. Then attach the end of the arm with the circular locking ring to the RED-LCD or RED-EVF.

Finally connect the cable from the camera body to the RED-LCD or RED-EVF. Carefully align the red dots on the socket and plug, and push firmly to establish contact.

Attaching the RED-LCD or RED-EVF

The RED-LCD and RED-EVF cables are interchangeable; but the outputs are not. The RED-EVF should be connected to the upper output; a RED-LCD should be connected to the lower output.

If using RED-DRIVE, place it into the RED-CRADLE and secure it with the four thumbscrews. Then connect the RED e-SATA cable to the RED-DRIVE™ and to the e-SATA input on the rear of the camera body. (In normal operation use the right angle connector to mate to the RED-DRIVE, and the straight connector to mate to the camera)

Remove the lens cap and mount the PL lens you wish to use. The lens will have four metal tabs with cutouts for the registration pin in the mount. If using S4/i compatible lenses the data pins should be oriented to 12 o'clock when mounting the lens in order to establish communication.

Attach matte box and motors, and any auxiliary power cables required to power these items.

Insert the digital media, such as RED-FLASH 8GB or 16GB compact flash (CF) card, or connect a RED-DRIVE™ hard disk drive, or RED-RAM™ flash drive via the RED custom e-SATA cable.

Inserting a Compact Flash card

Attach a RED-BRICK 140 battery using the v-mount battery plate, or connect an AC Power Adaptor or a RED-CHARGER to the DC input on the rear of the camera body. Now adjust the balance of the camera. The RED CRADLE/Universal Rail mount unit slides on 19mm rods so you can adjust the distance to the camera back. Find the position that best offsets the weight of the lens.

Finally tighten the butterfly locks to maintain that position. The shoulder pad/wedge plate adaptor is also designed to slide within the RED RAIL base plate until you lock it in place. You won't need to remove it to mount the camera on a tripod.

Power up.

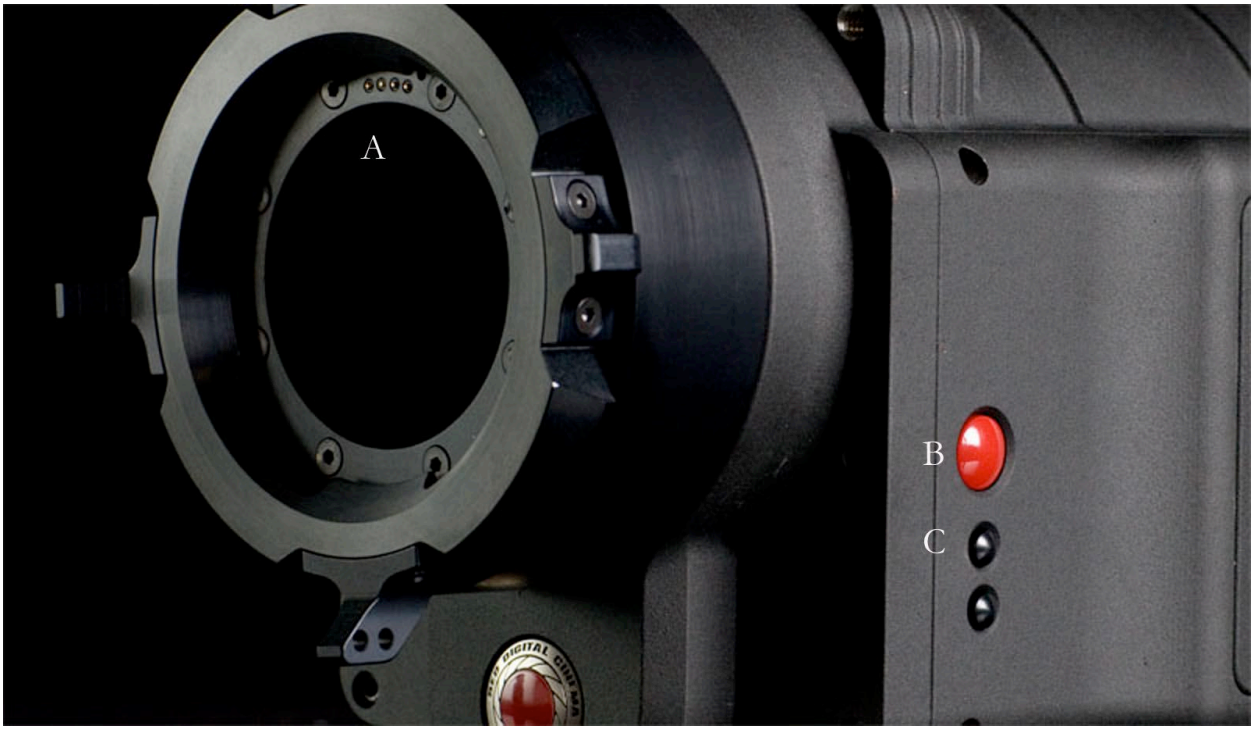
Press the On/Off switch to power the camera. The rear status display will illuminate, and after approximately 60 seconds it will display the camera PIN, firmware build and firmware version.

The P.I.N is a unique product identification number in the format ABC_123_XYZ. This code is included in the metadata recorded with each image. The PIN provides RED with tracking data for customer service and assistance in authenticating legal ownership of the camera.

When the camera is ready for use, the lower LED to the right of the status display turns green.

3. Physical Controls and Connectors

This section describes the physical controls and connectors on the RED ONE™ camera body.



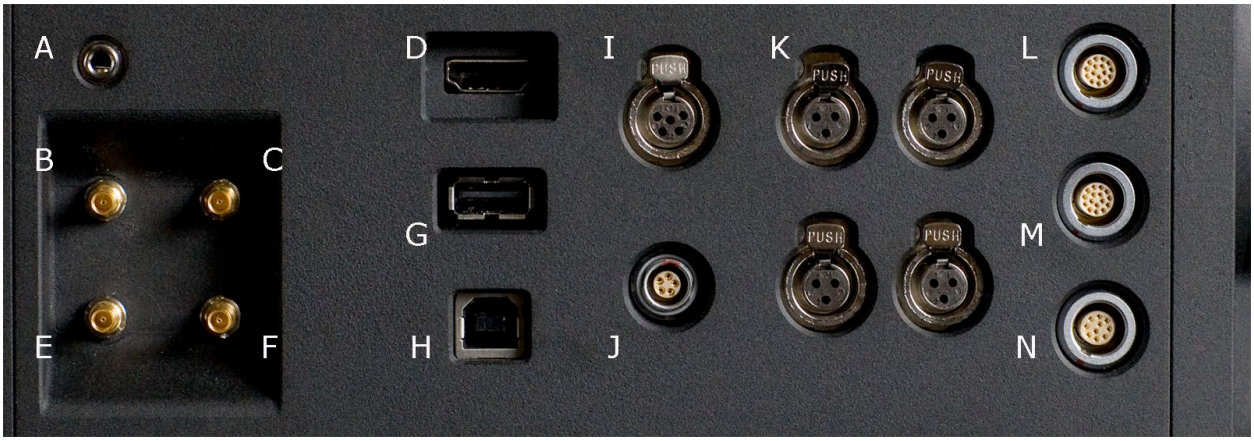
A. PL Lens Mount B. Record C. User Keys 1 and 2

A PL mount is provided as standard with the RED ONE™ camera. The mount is compatible with the majority of S35mm, 35mm and S16mm cinematography lenses. In addition, broadcast B4 mount lenses may be used if the camera is equipped with the optional B4 to PL mount optical converter.

The PL mount includes a 4-pin S4/i data interface. This allows the camera to gather lens metadata from lenses supplied by RED and Cooke Optics. Ltd, using the S4/i protocol.

On the left side of the camera body are a RECORD key and two User Keys. User Key 1 is pre-assigned to AUTO WB and User Key 2 is pre-assigned to 1:1 FOCUS CHECK, however these assignments can be changed in the KEYMAP preferences menu.

A SD Memory Card slot is located below this group of keys, which supports most SD Cards of up to 1GB capacity. It is not possible to store video or audio data to the card SD card, however it may be used for camera firmware upgrades and to store USER PROFILE and LOOK files.



A Headphone	B Program HD-SDI (A)	C Program HD-SDI (B)
D HDMI Out	E Preview HD-SDI	F Video Genlock
G USB-2 (peripheral)	H USB-2 (computer)	I Audio Monitor
J Timecode	K Audio Ch 1 – 4 (1-2 Upper Left - Right, 3-4 Lower Left - Right)	
L RED-EVF	M RED-LCD	N Aux / RS232

The right side of the camera contains all the video, audio and time code inputs and outputs.

From top left to bottom right, these comprise a 3.5mm stereo headphone jack, and four DIN 1.0/2.3 video connectors that support Program HD-SDI, Preview HD-SDI and Video Genlock.

Next is an HDMI output, a USB-2 “master” port for USB peripheral devices, a USB-2 “slave” port to connect the camera to another camera or computer based controller, a 5-pin mini-XLR audio output, a 5-pin timecode input/output and four three-pin mini-XLR audio inputs. Finally there are two 16-pin push lock LEMO connectors that provide video, communications and power for a RED-EVF and RED-LCD, and a 10-pin push lock LEMO connector supporting the Aux/RS232 port that can interface to a variety of B4 lenses and lens motor control devices.

One 6-inch length DIN 1.0 / 2.3 to BNC video adaptor cable and one 9-inch length 3 pin mini-XLR to mini-XLR cable plus a mini-XLR to full size XLR adaptor are provided with the camera.

Additional video and audio adaptor cables may be ordered online at www.red.com/store

Note: Cameras shipped prior to Sept 15th 2008, may have an earlier revision of the audio board and no S4/i pins installed in the P/L mount. Contact RED customer service about appropriate audio cables to use with these systems, and hardware upgrade options.

A User Menus select B Status Display C Record & Ready tallies

D Sensor menu E EXIT menu F UNDO / alternate action

G Record Start / Stop H Joystick I Audio / Video menu

J System menu

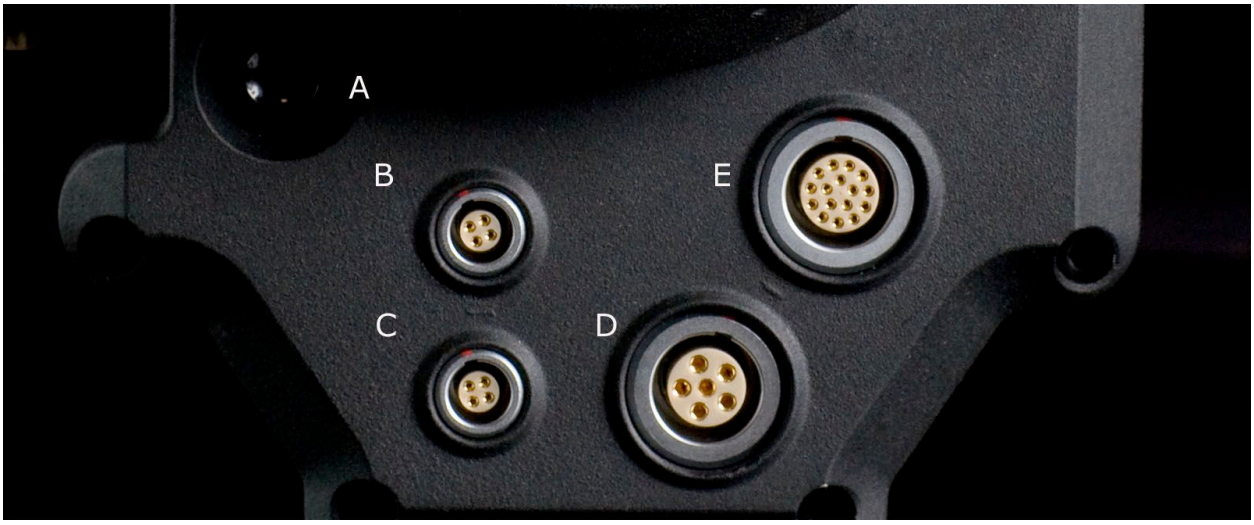
On the rear of the camera, several buttons surround a daylight readable LCD status display.

To the left of the status display are three User Menu buttons, which normally provide direct access Sensitivity, Shutter and Color Temperature menus. However the specific function of these keys may be re-programmed by the user, if desired, to provide quick access to other functions.

Below the LCD status display are the Joystick, and Exit, Undo / alternate action and RECORD buttons, plus the Sensor, Audio / Video and System menu buttons. The camera control menus are logically grouped under these last three buttons to provide streamlined camera operations.

The status display reports key camera status values, and is complimented by two LED's: the red LED provides a record tally, while the green LED indicates the camera is ready for operation.

The five buttons above the LCD display control clip playback. From left to right, the keys are Clip Start / Previous Clip, Play Reverse, Clip Play / Pause, Fast Fwd and Clip End / Next Clip.



A Power On/Off switch B Aux Power / GPIO A

C Aux Power / GPIO B D Camera 11.5 - 17V D.C Input

E e-SATA Interface (to RED-DRIVE™ or RED-RAM™ digital magazine)

Underneath the status display key group are the Power On/Off switch (top left) two 4 pin Auxiliary Power / GPIO outputs, 6 pin camera system POWER input and a 16 pin DRIVE interface.

Each Auxiliary Power / GPIO connector can supply 1.75 amps of unregulated 11.5 – 17V DC to accessories such as range finders or low power lens motors. The upper connector provides a GPI trigger (user programmable but defaulted to Record Start / Stop) and a Record Tally output. The lower connector provides a GPI trigger (user programmable but defaulted to Single Frame Record) and a Frame Recorded Tally output.

The DRIVE interface supplies power and data over e-SATA protocols to record REDCODE™ (TM) RAW compressed video data, metadata and audio to RED-DRIVE™ or RED-RAM™ digital media.

Power Up.

To power the camera up from a RED BRICK battery, press the power on/off switch once.

To power the camera up from a RED-CHARGER, connect it via the supplied power cable. Plug the RED-CHARGER into an AC power source and switch it on. After the green LED illuminates on the RED-CHARGER, the camera can be powered on by pressing its On/Off switch.

To power the camera down, press the power on/off switch once.

Note: After power down, is recommended that you wait approximately 10 seconds after the camera's green status LED goes off before powering the camera up again. If the green LED on the charger lights but then goes out, press the camera power On/ Off switch twice.

4. Theory of Operation

The RED ONE™ ™ Digital Cinema camera provides high performance digital imaging over a wide range of frame rates and optical formats including Super 35mm, 35mm and Super16mm. The camera is supplied as standard with a PL mount, and may be configured with 19 mm rods to accommodate most cinematography lenses, matte boxes and follow focus systems. Adaptors for 15mm offset studio and 15mm lightweight rods are also available.

In addition to compatibility with existing PL mount cinematography lenses; a select range of S35/35mm format PL mount prime and zoom lenses are available from RED Digital Cinema.

Other lens mounts, including Canon FD, and Nikon F are available from RED and 3rd parties, permitting the use of Nikkor and Canon photographic lenses. To use these mounts the PL mount must be removed. It is recommended that this should be done only in a dust-free environment, as the sensor and optical path will be exposed to the elements during this process.

A B4 mount to PL mount adaptor is also available to permit use of 2/3" HD lenses on the RED ONE™ camera. The optical coverage it provides is equivalent to S16 mm. Hence, the maximum recording resolution with these lenses will be 2K RAW. (2048 x 1152 pixel progressive scan)

MYSTERIUM™ Sensor

The MYSTERIUM™ sensor has been specifically designed for use with the RED ONE™ camera, and provides variable frame rate imaging over 1- 60fps in 4K or 3K resolution, and 1-120fps in 2K resolution record modes.

Native color balance for the MYSTERIUM™ sensor is 5,000 degrees Kelvin, but may be electronically compensated for any color temperature in the range 1,700 to 10,000 Kelvin. White Balance presets are available for Tungsten (3200K) and Daylight (5600K) lighting; the camera may also calculate a color neutralizing White Balance value using a standard white card technique.

MYSTERIUM™ includes integrated 12-bit resolution analog to digital conversion, capable of delivering up to 11 stops of dynamic range when operating in daylight at a sensitivity of 320 ISO.

Image Processing

Images received from the MYSTERIUM™ sensor are formatted as pixel defect corrected (but not color processed) 12-bit RAW data - similar in image quality to a high end digital stills camera.

The sequence of 12-bit RAW images received from the sensor is compressed using proprietary wavelet based REDCODE™ RAW compression. The RAW data recorded is independent of the RGB signal monitored from the monitoring path. ISO, white balance or other RGB color space adjustments made to the monitoring path are not burned into the recorded 12-bit RAW data.

Images can be stored on a high-speed Compact Flash, RED-DRIVE™ or RED-RAM™ media.

The camera's monitoring path converts 12-bit RAW sensor data white balanced 10-bit 1280 x 720 pixel RGB 4:4:4 video. This signal may be modified using ISO, white balance or other RGB color space adjustments and provides monitor feeds for the RED-EVF, RED-LCD, Preview HD-SDI and HDMI outputs.

Audio Recording

The RED ONE™ includes four channels of analog audio input processing, Peak Level meter, headphone monitor and 2-channel balanced analog audio output. Audio is digitized at 24-bit depth and 48KHz and recorded in synchronization with video and timecode to the attached media. Digital audio is also embedded in the HDMI, Preview and Program HD-SDI outputs.

Line Level and Microphone Level analog audio input signals are routed via a high quality A/D and pre-amplifier, whose gain stage may be controlled using the **Input Level** control to achieve the desired audio reference / recording level.

Line Level Inputs

Line level audio inputs are designed to operate at unity gain (0dB **Input Level**), therefore an appropriate line output level should be established by your field production mixer or other external signal source.

Reference signal level for Line inputs is 0dBu / 0.775 volts RMS / -20dBFS when operating at 0dB **Input Level**. The maximum input signal that can be applied before the onset of input signal clipping is +18dBu / 6.5 volts RMS / - 2dBFS. i.e. this setting supports a guaranteed minimum of 18dB of input signal headroom above reference, plus the maximum available Signal to Noise Ratio for the resulting 24-bit digital recording.

Microphone Level Inputs

The recorded signal levels of Microphone inputs are affected by the sensitivity of the microphone and the **Input Level** setting. Range is +10dB to +54dB, with a default value of +32dB. The camera operator should choose an **Input Level** that aligns the input signal to the reference line drawn vertically through the camera's PPM, indicating 0dBu.

This setting supports a guaranteed minimum of 18dB of input signal headroom above reference, plus the maximum available Signal to Noise Ratio for the resulting 24-bit digital recording.

Video Monitoring Outputs

In its default configuration, the RED ONE™ camera can simultaneously support a RED-EVF, RED-LCD, 3 HD-SDI outputs and one HDMI output, with two of these outputs supporting full GUI overlay graphics.

Default setting for GUI support is RED-EVF and RED-LCD. However, if either one of these is

not present, full GUI overlay support is automatically enabled on HD-SDI and HDMI outputs.

RED-EVF: 1280 x 848 resolution RGB 4:4:4 progressive video display with Surround View, frame guides and safe action / title overlays, zebra and false color exposure overlays, waveforms, camera status and operation menus.

RED-LCD: 1024 x 600 resolution RGB 4:4:4 progressive video display with Surround View, frame guides and safe action / title overlays, zebra and false color exposure overlays, waveforms, camera status and operation menus.

PROGRAM HD-SDI: When in record mode, these connectors provide two extra copies of the HD-SDI PREVIEW signal. When in playback mode, these connectors provide a dual-link 10-bit RGB 4:4:4 video signal.

PREVIEW HD-SDI: 1280 x 720 resolution 10-bit 4:2:2 video output (720p 50.00 /59.94 Hz).

PREVIEW HDMI: 1280 x 720 resolution 10-bit 4:2:2 video output (720p 50.00 /59.94 Hz).

Note: If a RED-EVF or RED-LCD is connected, the PREVIEW HD-SDI and HDMI outputs will provide Surround View, frame guides, safe action / title, and timecode / clip name. If both RED-EVF and RED-LCD are connected, these outputs only support Surround View.

Note: Only if a RED-EVF or RED-LCD is connected, the HDMI output can also support a 1280 x 848 resolution video output with Surround View, frame guides, safe action / title, timecode / clip name, waveform, and camera status and operation menu overlays. This signal should be compatible with the majority of DVI based SXGA+ computer monitors.

To select between these modes, press the SYSTEM menu key, and then MONITOR.

Press the joystick in, and then push the joystick to the right to highlight PREVIEW.

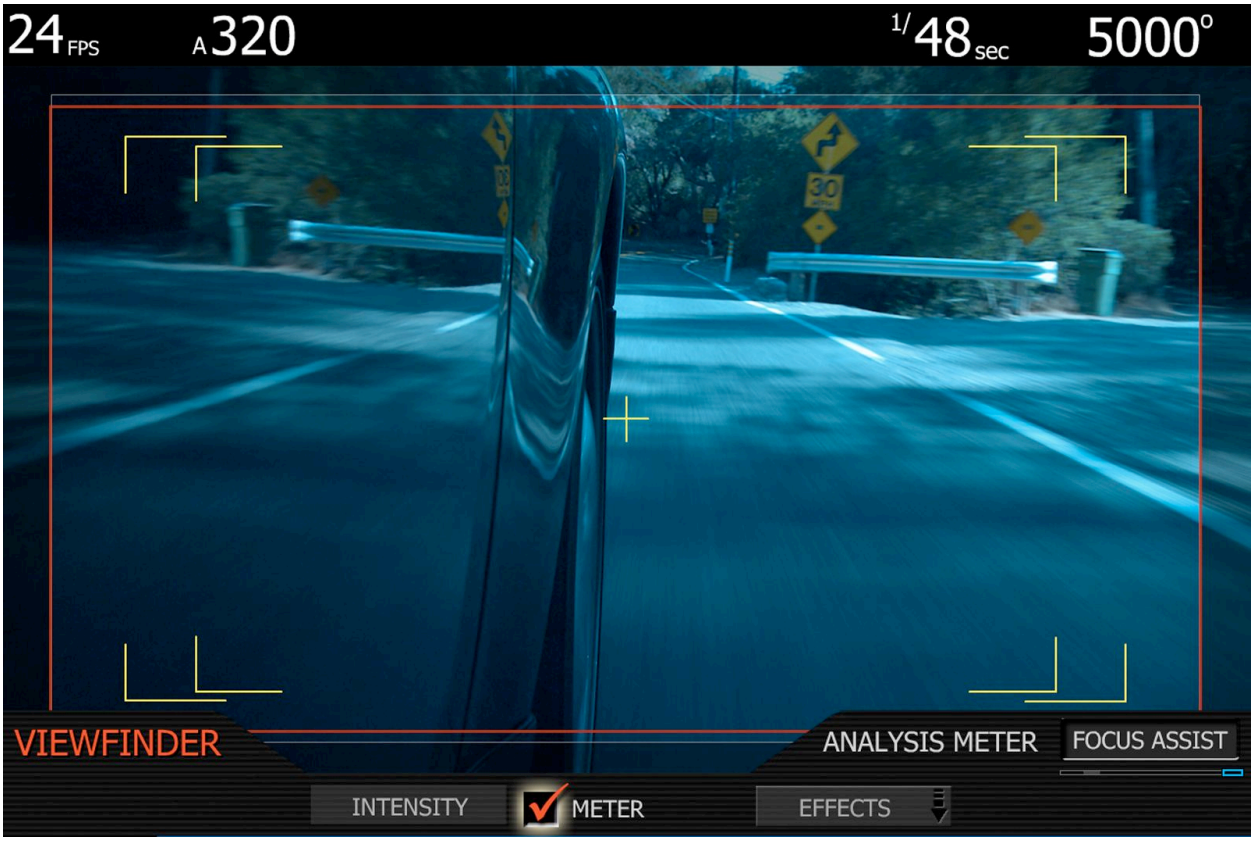
Rotate the joystick to select VIDEO (720p) or MENUS (DVI). The default is VIDEO (720p)

Press the EXIT key to return to the main camera menu. The Preview Output setting will be held in camera memory. Once it is set it will not need to be re-set when power cycling the camera.

RED-LCD and RED-EVF

The optional RED-LCD and RED-EVF are specialized video monitors, that may be attached to the camera body, and provide a variety of user tools to assist framing, focus and exposure.

- Surround View, which is an additional visible area outside the actual recorded image.
- Frame guidelines show common film presentation and television formats such as 2.40:1 and 1.85:1, picture center, and/or television aspect ratios such as 16:9, 14:9 and 4:3.
- Focus is aided by the high resolution of the displays, 1:1 Focus Check function, and two user selectable waveform based focus assist meters.
- Exposure is aided by dual zebras a false color meter and Luma and RGB histograms.



System information including instantaneous frame rate, sensitivity, shutter speed, color temperature, recording format, clip name, timecode, battery and media remaining is provided in the RED-LCD or RED-EVF monitor outputs, and the rear status display on the camera back.

For applications where a RED-LCD or RED-EVF are not desired – for example working on a crane – the Surround View video, frame guides, and exposure overlays are also available on the Preview HD-SDI output, providing remote camera monitoring up to 200 ft away.

Digital Magazines

REDCODE™ RAW compressed video, time code, audio and metadata, may be recorded to on-board or attached digital media devices including -

RED-FLASH: RED record speed verified 8GB or 16GB Compact Flash cards.

RED-DRIVE: A hard disk media based Digital Magazine of 320GB capacity.

RED-RAM™: A solid-state flash media based Digital Magazine of 128GB capacity.

Note: Digital Magazines may be directly connected to a computer via FireWire or USB-2.

Each clip is recorded with a unique clip name and with all the appropriate elements of the clip – REDCODE™ RAW files and QuickTime Reference files placed in a clip folder (.RDC)

All clips are in turn placed in a root directory (.RDM) The root directory (folder) contains all the clips recorded on that specific piece of digital media, so copying of clips from the digital magazine to backup media may be performed by a single drag and drop operation.

Record Indication

On record, the RED ONE™ camera provides a variety of record tallies. Timecode, normally displayed in white colored text, will turn red, and a small red dot will appear in the top left corner of the video monitoring outputs. The upper LED to the right of the status display screen will turn red, and if using an EVF, the front LED will also turn red. If media is not present, the camera will provide a warning as follows – RECORD ERROR NO_DIGIMAG.

Metadata

RED ONE™ cameras record Metadata, which is data that describes the precise characteristics of the picture and sound data, in each frame of footage. This may include camera specific setup information, project and clip management information, Edge code, Time code, date and GMT, lens parameters, audio settings and any video image processing information.

Clip Naming Conventions

When you push record, the camera names the clip being recorded on the digital media. The format of the clip name is Camera Letter + Reel Number + Month + Day + ** where ** is a two digit alphanumeric random number generated by the camera for each file

E.g. A001_C002_0502A6.RDC

Where: A = camera A, 001 = reel 001, C002 = clip 002, and 0502 = May 02

And A6 is a two digit alphanumeric random number generated by the camera. This number helps avoid duplicate file names if two cameras are inadvertently named A on the same set.

Three cameras identified as A, B and C can therefore have individually recognizable clips

A001_C001_0502**.RDC B001_C001_0502**.RDC C001_C001_0502**.RDC

A single camera identified as A can have individually recognizable reel numbers, such as

A001_C001_0502**.RDC, A002_C001_0502**.RDC, and A003_C001_0502**.RDC

A single camera identified as A can have individually recognizable clip numbers, such as

A001_C001_0502**.RDC, A002_C002_0502**.RDC, and A003_C003_0502**.RDC

Note - Even if the same Reel number and / or camera name are reused, the use of the two character random files generated non-duplicate file names, such as

A001_C001_0502A6.RDC, A001_C001_050267.RDC, and A001_C001_0502F8.RDC

Under normal operation, the reel number increments each time the camera formats a new piece of digital media, up to a maximum value of 999. However the reel number may be manually reset at any time to 001or other desired value.

A001_C001_0502**.RDC and then force to 1 to create A001_C001_0503**.RDC

SMPTE Timecode

As each recording is made, the RED ONE™ camera records two independent timecode tracks.

Edge Code is a SMPTE timecode track that always starts at 1.00.00.00 on the first frame of each piece of digital media. It is a sequential code that is continuous from frame to frame and also between clips. Edge Code is equivalent to RUN RECORD as used on broadcast cameras.

Time Code is a SMPTE timecode track that syncs to the camera's clock, or if operated in Jam Sync mode, syncs to an externally supplied SMPTE master timecode signal. It is therefore a sequential code that is continuous from frame to frame, but discontinuous between clips.

Note: Time Code and Edge Code are only output from the 5-pin timecode connector if OUTPUT is enabled in the TIMECODE setup menu, but are always embedded in HD-SDI.

When in Varispeed or Timelapse recording modes, the timecode counters are updated at the same frame rate as the recording. This means valid SMPTE timecode is created without count jumps that would affect clip playback or editing. If using an external timecode source with Jam Sync enabled, the clip's master time reference point is the first frame of the recorded clip.

When in Loop Record mode, the Edge Code will become discontinuous between clips, because frames copied into the cache memory are discarded. This may lead to problems with applications that assume a continuous timecode sequence. It is therefore recommended that Time Code be selected when operating this recording mode.

Power consumption

The camera draws approximately 75 watts in a typical configuration. A RED-BRICK 140Wh battery will run the camera and typical accessories for about 90 minutes. The camera is normally cooled by passive convection from the camera body, assisted as required by a fan.

When using the RED-CHARGER, recharge time for a single RED-BRICK battery is 200 minutes. The battery can also be partially charged, to approximately 80% capacity, in 120 minutes.

Charge times may be significantly longer if using another V lock compatible battery charger.

Note: V lock batteries from other manufacturers may be used with the RED ONE™ camera provided that they meet minimum current and voltage draw requirements. In general, avoid batteries rated at less than 7Ah and 90Wh. Battery status is provided in the camera's user interface (GUI) when using REDBRICK batteries. Other battery types will report as "D.C".

Operating the camera from the RED-CHARGER.

Plug the RED-CHARGER into an AC power source between (120 – 240V). Plug one end of the supplied 6-pin power cable into the Aux power output of the RED CHARGER and the other end into the DC power input of the camera. Now turn on the RED-CHARGER.

When the LED above the charger's Aux power output turns green, you can turn on the camera.

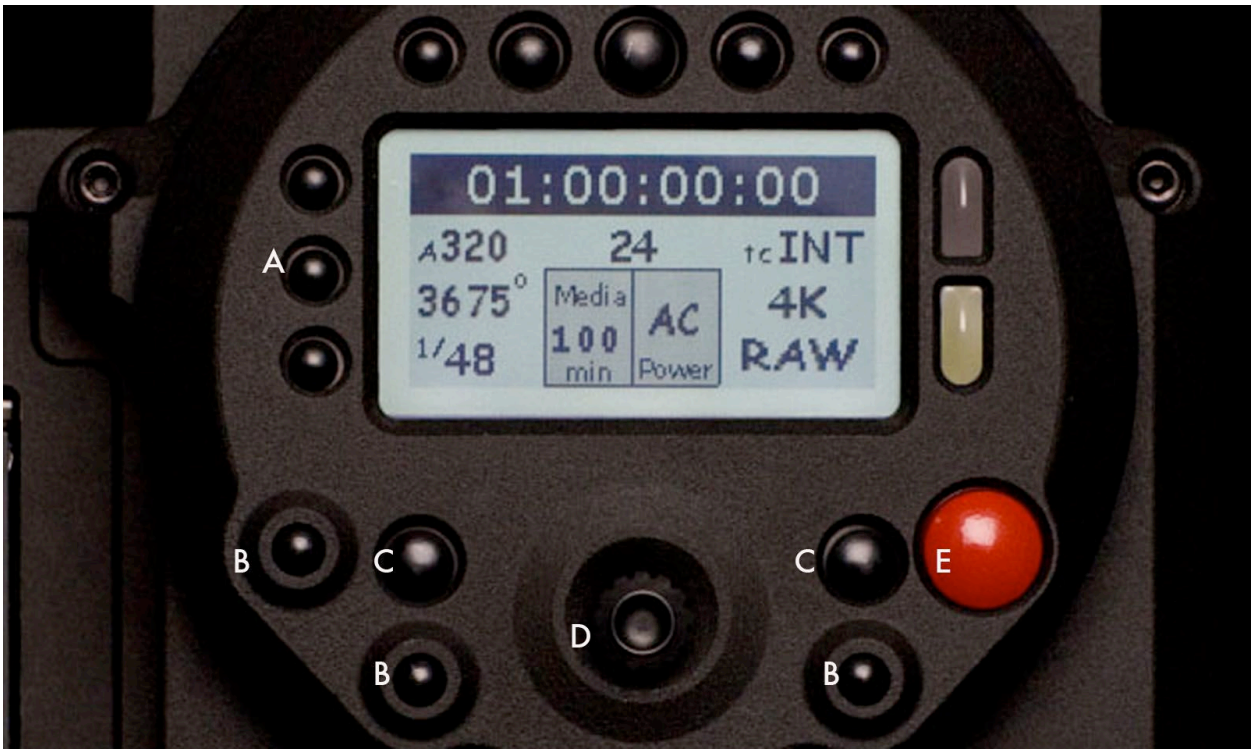
Note: The maximum sustainable power load of the RED-CHARGER is 100W @13.8V. The output of the charger is over current protected, and will shut down if an excess load condition occurs. If the output trips for any reason, remove any external loads from the camera, such as lights, motors etc, turn off the RED-CHARGER and repeat the above procedure.

5. Basic Operation

This section describes the basic controls of the RED ONE™ camera and how to initiate a project.

Control System and Status Display

Command inputs to the camera are made from the rear status display and associated buttons.



A - Quick Access	Access to Exposure, White Balance and Shutter Speed
B - Menu Access	Access to Sensor, Video and System menus
C - Menu Control	Exit and Undo keys
D - Joystick	The joystick is a multi-axis controller used to navigate camera menus.
E - Record	Record Stop / Start key

The five buttons above the display control clip playback. From left to right, the keys are Clip Start / Previous Clip, Play Reverse, Clip Play/Pause, Fast Fwd and Clip End / Next Clip.

Note: Quick Access keys may be re-programmed if desired. Enter the menu that you wish assigned to one of these keys, then press and hold the A, B or C key until the camera reports " User button A/B/C has been assigned to this menu" Subsequent presses of this key will return the camera to that same menu location.

Status Display

The status display mounted at the rear of the RED ONE™ camera provides a snapshot of the camera setup. The elements include –

Timecode / Status	reports current timecode value, clip name or system messages
ASA Value	reports current exposure index
Project Frame Rate	reports the project frame rate, 24.00 fps in this example
Timecode	reports timecode lock status
White Balance	reports current color temperature
Media	reports remaining media capacity in %
Battery	reports remaining battery capacity or connection to AC power
Shutter Speed	reports current exposure time
Format	reports video recording format, 4K RAW in this example

Note: The timecode value reported is Edge Code or Time Code, as selected by the user in the TIMECODE menu. During recording, the Clip Name is reported in this display field.

Setting up a project.

Before recording, the camera must be instructed to follow a Record Quality, Frame Rate and Resolution. These values are set in the PROJECT sub menu located in the SYSTEM menu.

1. Press the SYSTEM menu key, then PROJECT. This highlights the PROJECT sub-menu

2. Push the joystick right, then press to enter the CONFIGURE menu to set the QUALITY

Quality. Choose between REDCODE™ 28 and REDCODE™ 36. Default is REDCODE™ 36.

Note: Choosing REDCODE™ 36 limits available frame rates and resolutions to CF cards.

Note: Leave MAX box checked, unless recording 4K 16:9 and needing real time decode.

3. Next select the project TIME BASE (this parameter was formerly known as Frame Rate)

Time Base: Choose between 23.98, 24.00, 25.00 or 29.97fps. The time base establishes the base frame rate for a project, and so should not be adjusted. Use Varispeed if shooting above or below this base frame rate for slow motion effects.

Note: 2K and 3K record resolutions also support 50.00 and 59.94 fps Project Time Bases.

4. Next select the project RESOLUTION

Resolution. Choose 4K, 3K or 2K, or 2:1 variants. Use 2K or 2K 2:1 for S16mm/B4 lenses.

Note: A project can only support one project Time Base as this defines the frame rate to be used for timecode and for clip playback. It is also the primary frame rate for acquisition, but variable speed (over-crank and under-crank) recordings can be made above and below this base frame rate. On playback these recordings will be displayed at the Project Frame Rate

Note: If operating on a multi-camera production, enter a different Camera I.D for each camera using the SLATE menu; otherwise skip this step; the camera is ready to shoot.

Recording

Check that you have a RED-DRIVE™ attached, or Compact Flash card inserted in the camera. To initiate a recording, press either RECORD button. Press once to begin recording and again to stop recording. The camera will automatically create a file name for every clip recorded on the digital magazine or media.

REDCODE™ RAW data recordings store the Color Temperature and Exposure (ISO) and any RGB color processing values you use in the monitor path as metadata. This metadata is used in RED Alert!™ or other post production software as initial white balance, exposure and color correction points i.e. you can change these if you wish when you process the RAW footage.

Time Code and Edge Code values used by the camera are Non Drop Frame (NDF), Drop Frame (DF) is not supported. Audio is captured at 48KHz 24-bit resolution per channel, uncompressed.

Digital media should be treated with equal care as exposed film or a videotape master. We recommend storing digital media that contains your footage in a secure location and backing up the data on another digital media, such as data tape or a hard disk drive.

Each clip is recorded to the digital media in a separate folder and with a unique clip name. To copy the clip from the digital media to a Macintosh or Windows computer, just drag and drop its folder to the computer's storage device. If you open the Clip folder, it will look like this –

A011_05013M.RDM	May 1, 2008, 12:18 AM	--	Folder
A011_C001_05015C.RDC	May 1, 2008, 12:18 AM	--	Folder
A011_C002_050167.RDC	May 1, 2008, 12:18 AM	--	Folder
A011_C002_050167_001.R3D	May 1, 2008, 12:20 AM	2 GB	RED RAW R3D
A011_C002_050167_002.R3D	May 1, 2008, 12:21 AM	549.4 MB	RED RAW R3D
A011_C002_050167_F.mov	May 1, 2008, 12:21 AM	64 KB	Quick... Movie
A011_C002_050167_H.mov	May 1, 2008, 12:21 AM	64 KB	Quick... Movie
A011_C002_050167_M.mov	May 1, 2008, 12:21 AM	64 KB	Quick... Movie
A011_C002_050167_P.mov	May 1, 2008, 12:21 AM	64 KB	Quick... Movie
A011_C003_05016A.RDC	May 1, 2008, 12:21 AM	--	Folder

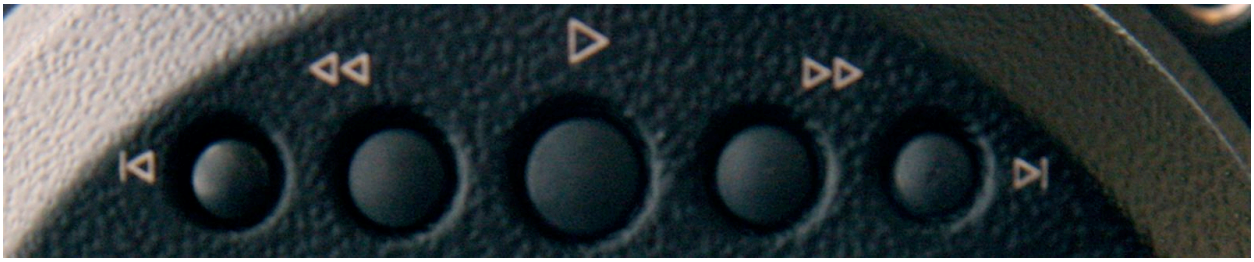
The Clip folders (.RDC) are held in a root directory (.RDM) on the digital magazine. In each folder there will be one or more REDCODE™ RAW data files (.R3D) containing RAW sensor data, plus audio and metadata, and four QuickTime reference movies, which allows a QuickTime Player to display the RAW data at _F full, _H high, _M medium or _P proxy resolutions.

Double click on one of the QuickTime reference movies to see a preview of the .R3D file. Playback frame rate will depend on the processor speed of your computer. If the frame rate is too low, select a smaller QuickTime movie.

Note: to operate with QuickTime under Macintosh OSX, install the supplied REDCODE™ RAW plug-in available at www.red.com/support. Windows is not currently supported.

Playback

Playback of recorded clips is available on-camera using the Transport Control Keys.



The I> key is used to enter PLAYBACK mode, and to initiate playback of the last recorded Clip. Press it once to enter Playback mode, and a second time to start playback. Once in clip playback, this key acts as a Play/Pause toggle.

The >> key permits the Clip to be played back at higher speeds. Each press of this key cycles clip playback between 1 x, 2 x, 8 x and 32 x speed playback.

The << key permits the Clip to be played back in reverse. Each press of this key cycles clip playback between – 1 x, - 2 x and - 8 x speed playback.

The I< key cues the Clip to its Start Frame. If already at the Start Frame, pressing this key again will cue to the Start Frame of the previous clip recorded on the digital media, if one exists.

The >I key cues the Clip to its End Frame. If already at the End Frame, pressing this key again will cue to the Start Frame of the next clip recorded on the digital media, if one exists.

Note: It is not necessary, to exit Playback mode prior to the next recording. To exit playback mode, either press the RECORD key, or press the EXIT key to the left of the joystick.

When in playback, all cursors will be disabled, and the camera provides a clean feed of the recorded video signal at 1280 x 720 resolution on the Preview HD-SDI and HDMI outputs.

Depending on the capture frame rate, pull down will be added to create a standard 1280 x 720 progressive scan 59.94Hz or 50.00 Hz high definition video signal. At this time there is no embedded SMPTE timecode on either the Preview HD-SDI or HDMI outputs, however they both include 4 independent channels of 24-bit 48KHz audio.

Note: If PLAYBACK MODE preference is set to 1080p, HD Preview HD-SDI and HDMI outputs switch 1920 x 1080p progressive scan 10-bit 4:2:2 at 23.98, 24.00, 25.00 or 29.97 fps.

Note: If PLAYBACK LOOK preference is set to CLIP, the color adjust metadata will be read from the recorded clip. If CAMERA, the metadata used are the current camera settings.

Monitoring.

RED-LCD and RED-EVF monitors are factory preset digital displays. There are no saturation, peaking or contrast adjustments as found on analog monitors to correct color reproduction.

Monitor outputs on the RED ONE™ camera are set up for REC 709 gamma and color space. Image intensity can be adjusted to compensate for ambient lighting conditions. For the RED-LCD, use the Up / Down keys on top of the display. For the RED-EVF use the rotary encoder.

To assist with exposure, all monitor outputs can display either a dual Zebra pattern or a False Color exposure meter overlaid on the video. In addition the RED-EVF and RED-LCD outputs can display a RGB histogram, exposure "stop lights" and RAW sensor data exposure meter.

RED-LCD Controls.

The top of the RED-LCD provides two round and two triangular keys. On the left is User Key 5 whose function can be defined the USER KEY preferences menu. The two triangular keys in the center are used to increase or decrease backlight intensity. The key on the right switches the display between Video plus Frame Guides and Menus, to Video plus Frame Guides only.

RED-EVF Controls

The RED-EVF comprises the following components: high-resolution color display, focus ring, rotary encoder / switch, two user definable and one fixed function button.

The color display provides a 1280 pixel x 848-pixel resolution progressive scan color image equivalent to viewing a 17" reference color monitor from a distance of approximately 4 ft.

The focus ring on the viewfinder may be adjusted for optimal subject focus for your eye. The available diopter range is +1.5 to -2.0.

The rotary encoder / switch may be used to adjust a variety of parameters. These include the EVF Intensity, but also camera parameters such as Ch1 Audio Level or Ch 2 Audio Level, and Shutter speed, Varispeed frame rate and ISO setting.

To activate this control, push the switch once. Rotate the switch until the white selection box overlays the parameter you wish to adjust. Then press the switch to lock that selection in.

Rotating clockwise increases the parameter value, counterclockwise decreases the parameter value. Push the switch once more to lock the parameter and exit the parameter adjust mode.

INT	adjusts EVF backlight display intensity
CH1	adjusts Ch 1 microphone audio level
CH2	adjusts Ch 2 microphone audio level
SHU	adjusts Shutter speed
VAR	adjusts Varispeed frame rate
ISO	adjusts Sensitivity rating of monitoring
OFF	EVF control – Active / Disabled

The fixed function button (located closest to the focus ring) selects 1:1 FOCUS CHECK mode. When selected this shows the central region of the MYSTERIUM™ sensor in native 4K resolution.

Note: This function is not available during RECORD.

The central pair of buttons is User Keys 3 and 4. In their default settings USER 3 turns COLOR TOOLS (monochrome or false color) On/Off, and USER 4 turns the METER (e.g. WAVEFORM or FOCUS ASSIST) On/Off. The functions of USER 3 and USER 4 may be changed if desired in the USER KEY preferences menu.

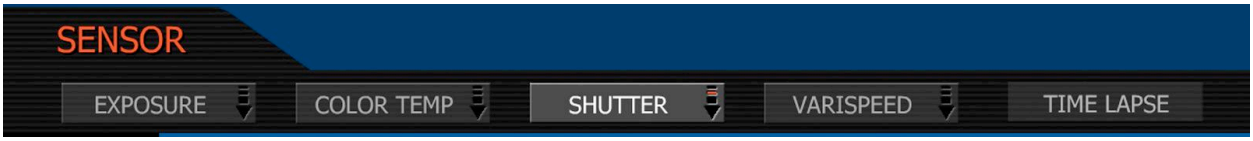
Using external HD-SDI or HDMI monitors.

To aid external monitor alignment, the RED ONE™ camera provides a range of test signals including SMPTE Bars, Back and White Fields, Luma and Chroma Ramps, and a Chip Chart.

Note: the internal test signals cannot be recorded; they are provided to align external video recorders or monitors connected to the camera via the HD-SDI or HDMI ports.

6. Sensor Menu Controls

This section describes how to set sensor specific menu parameters including Sensitivity, Shutter Speed, Color Temperature, Varispeed and Timelapse. To access these functions, press the SENSOR menu key or one of the direct access keys to the left of the status display.



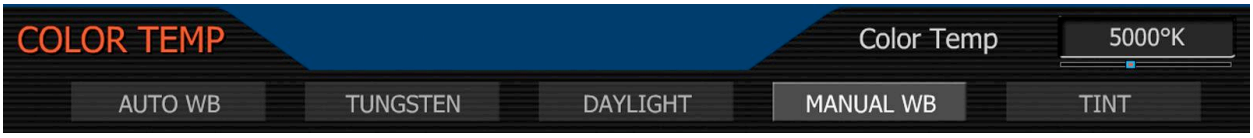
Note: Sensitivity and Color Temperature metadata values are stored as metadata and are also used to modify the RED-LCD, RED-EVF, Preview HD-SDI and HDMI monitor outputs.

They do not affect 12-bit REDCODE™ RAW data recording, the stored metadata values may be used by REDCODE™ RAW compatible NLE and image processing applications if desired.

Sensitivity

Sensitivity: adjusts the camera's operating sensitivity. The default sensitivity value is ISO 320, adjustable in 1/3rd stop increments from ISO 100 to ISO 2000. When sensitivity is adjusted, the camera metadata logs the change and the monitor path reacts accordingly.

Color Temperature



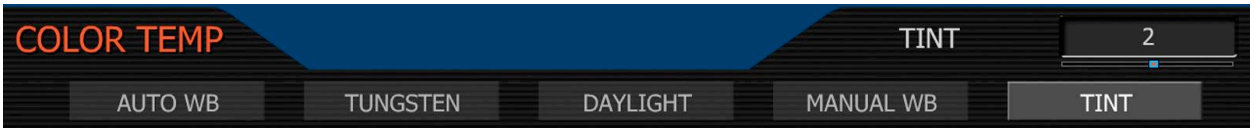
Color Temperature: adjusts the purity of white reproduction of the RGB monitoring paths at different Color Temperatures of ambient light. Factory default is 5,600 degrees Kelvin.

Preset values are available for Tungsten (3,200K) and Daylight (5,600K). The operator may also manually set any other Color Temperature in the range 1,700 to 10,000 degrees Kelvin.

The Automatic White Balance function allows the camera to calculate a Color Temperature that will render a white object as white. AWB mode analyzes the central 25% of the image visible in the monitor.

To use Auto WB, place a white or gray object under the ambient light, select the Auto WB parameter and then press the Joystick once. Auto WB may also be assigned to a User Key.

Tint



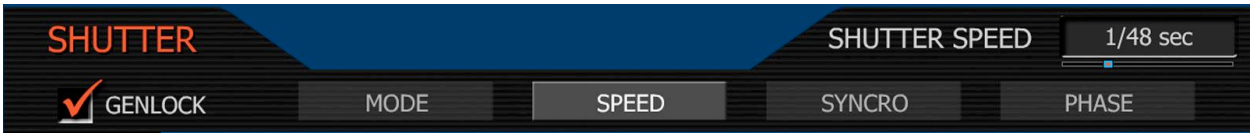
Color Temperature calculations assume a pure light source that may not be true in the specific scene the camera is imaging. To compensate for any residual colorcast, the TINT parameter can adjust the RGB color balance with a compensating Magenta - Green color component.

Note: Pressing Auto WB calculates a new Tint value. This is maintained if the Color Temp is adjusted via the Manual WB parameter. If you select the Tungsten or Daylight presets, Tint will be reset to zero, which is the default value.

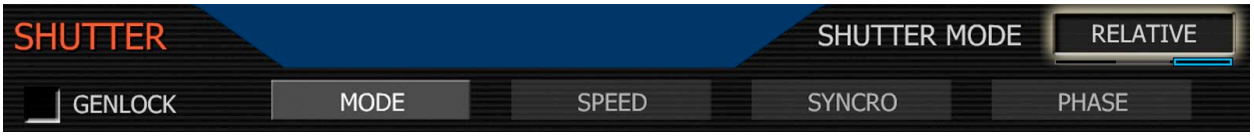
Shutter Menu

Adjusts exposure time of each frame captured by the MYSTERIUM™ sensor. Shutter speed presets are available for all common speeds (and corresponding angles) at 24 / 25 fps and 50 / 60 fps.

Preset shutter speeds may be adjusted using the RELATIVE and SYNCRO shutter parameters.



Genlock: references Shutter scan start time (phase) to an external Tri-Level Sync genlock signal. For 3D and multi-camera, permits scan time and scan phase of all cameras to be matched.



Mode: enables one of three following shutter modes. Default selection is Normal.

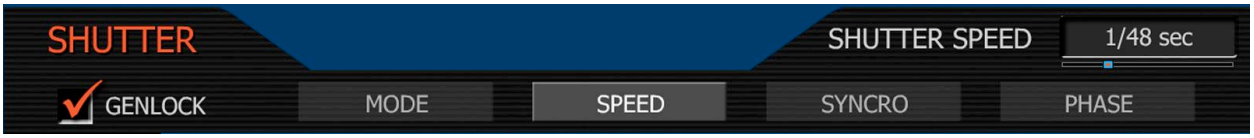
Normal: Shutter Speed is defined exclusively by the Shutter Speed setting.

Syncro: Shutter Speed is defined by Shutter Speed, but modified by Syncro setting.

Relative: Shutter Speed is defined by Shutter Speed, but modified by the capture fps.

Note: If operating in Relative or Syncro modes, the shutter speed is reported in yellow text.

Note: If the operator requests a shutter speed (angle) that is outside the capability of the camera in that mode, the actual shutter speed (angle) used will be reported in red text.



Shutter Speed

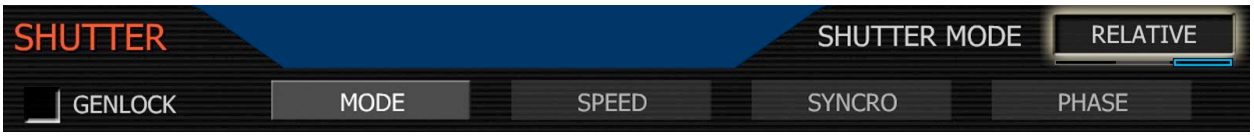
When operating in **Normal** mode, the **Shutter Speed** value used by the camera is fixed, i.e. it is independent of the image capture rate. This is opposite from a mechanically shutter camera.

Decreasing Shutter Speed will more light falls on the sensor, increasing exposure and motion blur on any objects moving within the frame. As Shutter Speed increases less light falls on the sensor, decreasing exposure and motion blur on objects moving within the frame.

Speed: Exposure times presets include: 1/24, 1/25, 1/30, 1/32, 1/33, 1/40, 1/48, 1/50, 1/60, 1/96, 1/100, 1/120, 1/125, 1/192, 1/200, 1/250, 1/384, 1/400, 1/500, 1/696, 1/800, 1/1,000, 1/1,200, 1/2,000th sec.

When operating at 23.98 or 24.00fps, these equal common shutter angles of

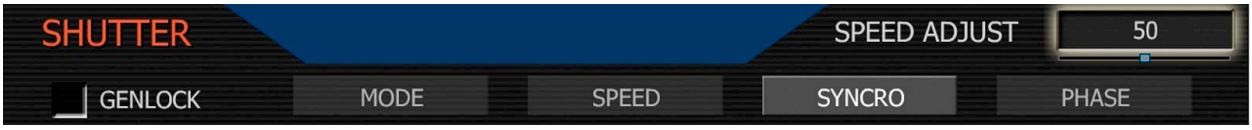
1/32nd	270 deg	1/96	90
1/48	180	1/192	45
1/60	144	1/384	22.5



Relative: When operating in this mode, the Shutter Speed values are proportionately reduced or extended to correspond to changes in the instantaneous capture frame rate.

This mode is analogous to use of a fixed shutter angle on a mechanically shuttered camera.

E.g. Enabling Relative mode with 1/48th sec shutter at 24fps will mean 1/96th sec for 48fps, and 1/16th sec for 8fps. This achieves the same visual result as setting a180 degree shutter.



Syncro: When operating in this mode, the Shutter Speed values may be proportionately reduced or extended to tune exposure time to a precise value. Range 10 – 90. Default 50.

E.g. Setting Syncro to 53 with a 1/60th sec shutter is equal to 1/56.6 sec exposure time.

Phase: provides a delay relative to the start of the frame for the exposure time. Phase may be adjusted over the range - 45 to + 45 degrees. Default value is 0.

Note: To Convert Shutter Speed to Angle Equivalent

Equivalent Degrees = (Shutter Speed x Frame Rate x 360)
E.g. = (1/48 x 24 x 360) = (8640 / 48) = 180

Shutter	Degrees	Shutter	Degrees
1/32	270	1/120	72
1/48	180	1/192	45
1/50	172.8	1/348	22.5
1/60	144	1/696	11
1/96	90	1/1000	8.6

Note: To Convert an Angle to an Equivalent Shutter Speed

Equivalent Shutter = 1 / (Frame Rate x 360 / Angle)
E.g. = 1/ (24 x 360 / 180) = 1/ (8640 / 180) = 1 / 48

Degrees	Shutter	Degrees	Shutter
270	1/32	72	1/120
180	1/48	45	1/192
172.8	1/50	22.5	1/348
144	1/60	11	1/696
90	1/96	8.6	1/1000

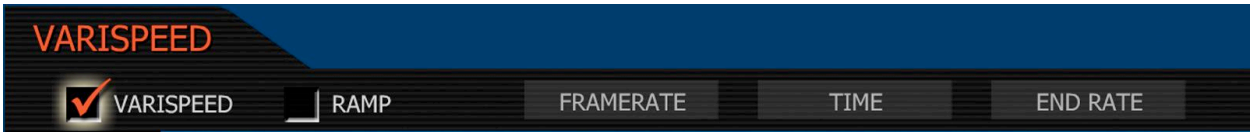
Varispeed

The Varispeed menu supports Variable Frame Rate recording at speeds faster or slower than the Project Frame Rate and Frame Rate Ramping. Varispeed recordings can be initiated by pressing the Record key, or by GPI trigger.

Note: In all Varispeed modes, audio recording is disabled.

Note: In Varispeed modes timecode is written to digital media at a rate equal to the instantaneous capture rate. This ensures that the recorded REDCODE™ RAW data has valid and sequentially incrementing timecode for use by non-linear editing devices.

Note: In Varispeed, the frame rate display turns yellow, the audio panel reports VARISPEED.

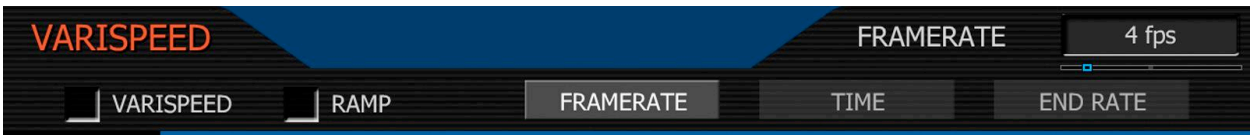


Varispeed: Before recording, enable this function by checking the **Varispeed** checkbox.

Ramp: enables a speed ramp; a transition over **Time** from the **Frame Rate** to an **End Rate**

On-Record: On recording start, the capture frame rate will immediately start transitioning from the Frame Rate to the End Rate.

On-Event: On recording start, the capture frame rate starts out at the Frame Rate, the start of the transition to the End Rate occurs only when an external GPI trigger has been received.



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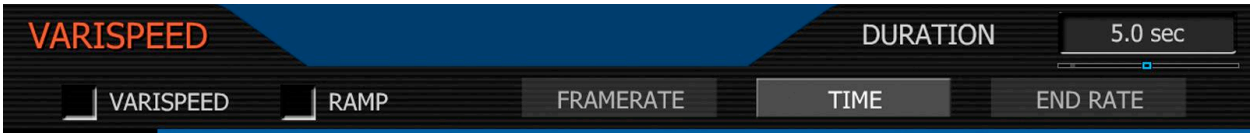
Framerate: enables the user to choose any single frame rate. Minimum frame rate is 1 fps; maximum frame rate is a function of REDCODE™ setting, record resolution and media type:

REDCODE™ 28	RED 8GB CF	RED 16GB CF	RED-DRIVE	RED-RAM
2K 2:1	100 fps	120 fps	120 fps	120 fps
2K 16:9	100 fps	100 fps	100 fps	100 fps
3K 2:1	50 fps	60 fps	60 fps	60 fps
3K 16:9	30 fps	50 fps	50 fps	50 fps
4K 2:1	25 fps	30 fps	30 fps	30 fps
4K HD	25 fps	30 fps	30 fps	30 fps
4K 16:9	25 fps	30 fps	30 fps	30 fps

REDCODE™ 36	RED 8GB CF	RED 16GB CF	RED-DRIVE	RED-RAM
2K 2:1	75 fps	100 fps	120 fps	120 fps
2K 16:9	75 fps	90 fps	100 fps	100 fps
3K 2:1	30 fps	48 fps	60 fps	60 fps
3K 16:9	30 fps	40 fps	50 fps	50 fps
4K 2:1	25 fps	30 fps	30 fps	30 fps
4K HD	----	25 fps	30 fps	30 fps
4K 16:9	----	25 fps	30 fps	30 fps



Time: When Ramp is enabled, this value specifies the transition time to be used by the camera between the (start) Frame Rate and the End (frame) Rate. Default value is 5 seconds.

End Rate: When Ramp is enabled, this value specifies the final (ending) speed of the ramp in frames per second. When a ramp transition has been completed, the camera will continue to record at the End Rate until the end of the Recording.

Note: When in Varispeed modes the camera maintains the last exposure time selected (unless the requested frame rate requires a shorter exposure time) to provide a constant exposure. If a variable exposure is required set the Shutter Mode to Relative - this is a fixed angle setting.

Timelapse

The Timelapse menu supports single frame image capture and step frame recording under the control of an internal Intervalometer, side RECORD key or an external (GPI) trigger.

Enable: After making any adjustments in the Timelapse menu, check the Enable box to enter these values and enable the Timelapse record mode. The UI indicates by changing the top left frame rate display from **fps** to **TL**, and the lower right audio level display to **TIMELAPSE**.

Trigger Mode: Specifies if the camera is to use a fixed Interval of time or wait for a side record command or external GPI contact closure to initiate the next frame capture.

Interval: the camera waits for the period of time defined by the **Interval** parameter.

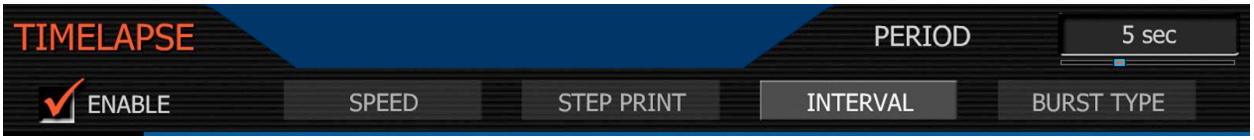
One-Shot: the camera waits for a side record command or external GPI contact closure.

The default setting is One-Shot.

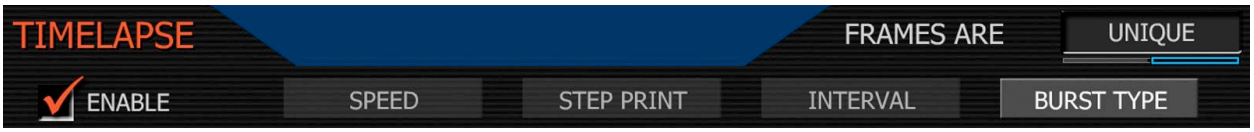
Speed: Specifies the shutter speed to be used during Timelapse. This control is the same as is available in the **Shutter** menu, but it provides access to additional shutter speeds that may be used in Timelapse recording.

The additional exposure time presets are 1/2, 1/3 1/4, 1/6, 1/8, 1/12, 1/16 second.

Step Print: Specifies the number of times each single frame captured in Timelapse mode is to be recorded to the digital media. Available range is 1 to 10 frames. Default value is 1 frame.



Interval: Specifies the number of seconds the camera will wait before the next image is captured. Range is 1 to 1024 seconds. Default setting is 5 seconds.



Burst Type: Specifies the type of burst recording, either Repeat or Unique. Default is Unique.

Repeat: Specifies that each frame captured during the burst record be repeated. That is for each Timelapse event, a single frame is repeated N times, where N is the Step print value.

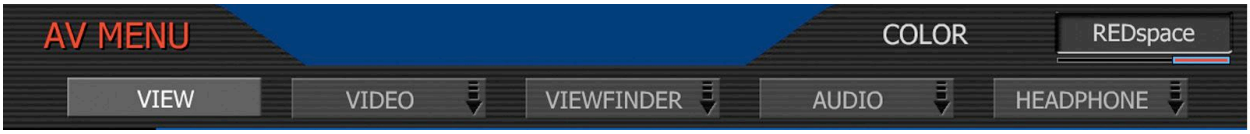
Unique: Specifies that each frame captured during the burst record is unique. That is for each Timelapse event, N frames are captured and recorded, where N is the Step print value.

Note: When recording in Timelapse mode, the RECORD tally lamp will remain illuminated.

Each successive event uses the next available Edge Code and Time Code value and uses the existing clip name. This results in a complete Timelapse sequence with a single clip name and correct timecode sequence. To exit Timelapse mode press the RECORD button.

7. Audio / Video Menu Controls

This section describes monitor path parameters such as viewfinder, and RGB color and gains. These parameters are accessed from the VIDEO menu access key.



Available sub menus include VIEW, VIDEO, VIEWFINDER, AUDIO and HEADPHONE

VIEW

The VIEW sub menu allows the user to choose the mode of monitor path image processing. The default selection is **REDspace**.

REDspace: monitor path image processing uses custom REDspace tonal response curve.

REC709: monitor path image processing uses SMPTE REC 709 tonal response curve.

RAW: monitor path image represents the RAW sensor data, bypassing the color matrix.

Video Menu

The four available submenus are LOOK, COLOR, GAIN and TONE

Note: Color and Gain and Tone values used by the monitor path are stored as metadata for use in REDCODE™ RAW compatible image processing applications. They can be used to visualize a specific color “look” but do not affect the REDCODE™ RAW recorded data.

LOOK menu

The LOOK menu permits Video, Gain and Tone values to be exported or imported to an SD Card. Look (.RLK) files may be read by another camera, but not RED ALERT!™ or RED-CINE™

Clear: Resets the settings for Color, Gain and Tone menu parameters to their default values.

Import: The current settings for Color and Gain parameters will be overwritten by the values stored on the SD Card. The available LOOK files will be listed in alphabetical order, e.g. -

PROFILE_1

PROFILE_2

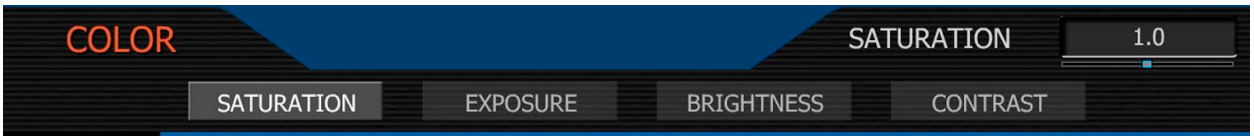
MAGENTA_TINT

Export: The current settings for Color and Gain parameters are stored to the SD Card. The camera generates a file name of the format PROFILE_**.RLK

Note: you may edit LOOK filenames on a computer, but do not change its extension (.RLK) or the camera will not recognize it. Restrict file names to 12 characters.

Color sub menu:

The Color sub-menu selects various image processing parameters that may be applied to the monitor path. They do not affect the actual REDCODE™ RAW data being recorded.



Saturation: adjusts color saturation. Range is 0.0 (monochrome) to + 2.0 (super color)

Exposure: adjusts exposure compensation. Available exposure range is – 2.0 to +4.0

Brightness: adjusts brightness without crushing highlights. Available range is – 10 to + 10

Contrast: adjusts the overall contrast of the image. Range is -1.0 (flat) to +1.0 (max contrast)

Gain sub-menu

The Gain sub-menu selects various image processing parameters that may be applied to the monitor path. They do not affect the actual REDCODE™ RAW data being recorded.

Master: adjusts the gain of RED, BLUE and GREEN equally. Range is 0.0 (no Red) to +4.0

Red Gain: adjusts the gain of the RED channel only. Range is 0.0 (no Red) to +4.0

Blue Gain: adjusts the gain of the BLUE channel only. Range is 0.0 (no Blue) to +4.0

Green Gain: adjusts the gain of the GREEN channel only. Range is 0.0 (no Green) to +4.0

TONE menu

The TONE sub-menu allows a Tonal Response Curve to be overlaid on the video monitor path. The curves parameter values are stored in metadata, and may be visualized in RED Alert!™ post-production software as Curve data.

Curve: This checkbox enables the Tonal Response Curve. Default setting is enabled.

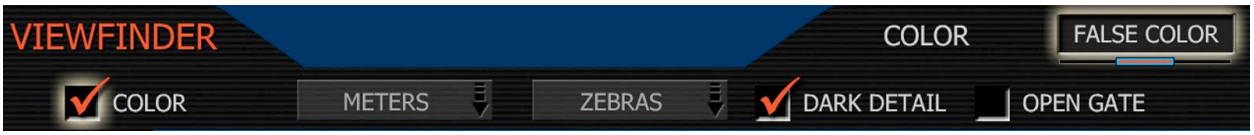
Define: Selects the curve control point to be adjusted - Black, Toe, Center, Knee or White. Each control point comprises two independent values, one each for X and Y-axis locations.

X: Adjusts the location of a control point along the X-axis on the tonal response curve.

Y: Adjust the location of a control point along the Y-axis on the tonal response curve.

Viewfinder Menu

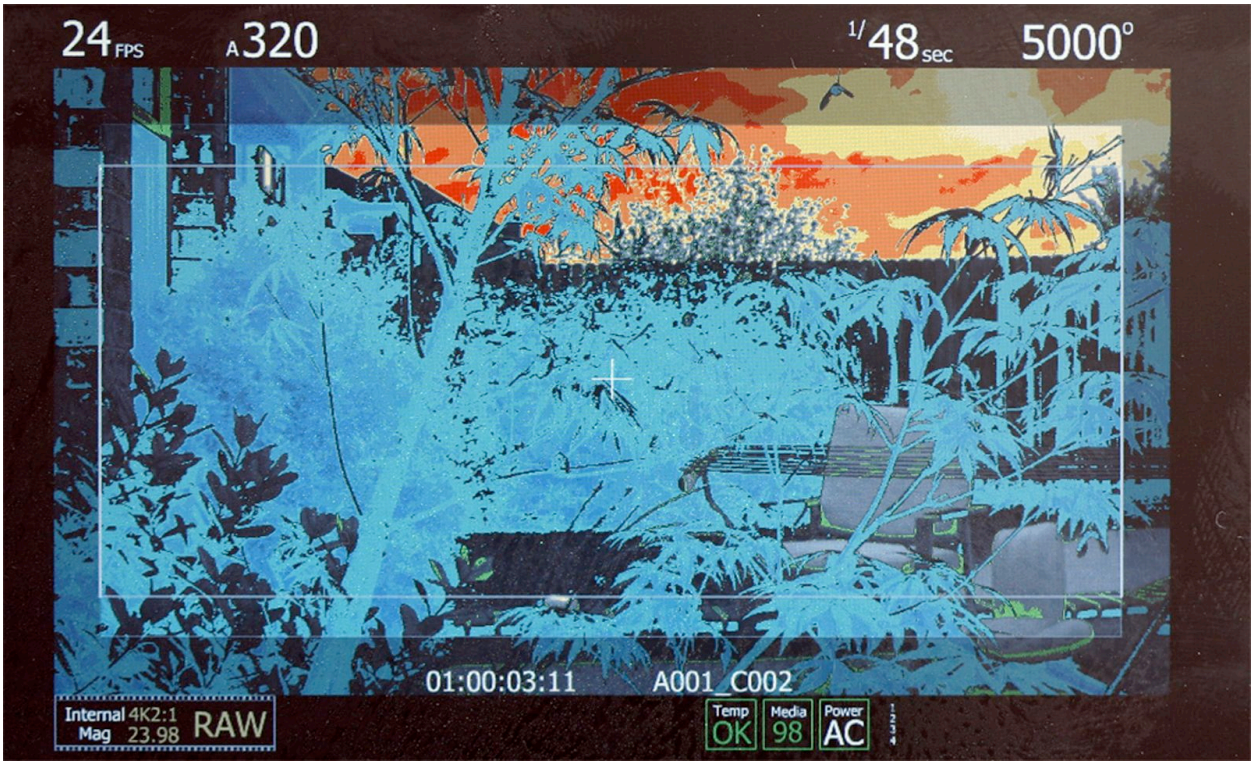
This menu permits the operator to adjust operation of the viewfinder.



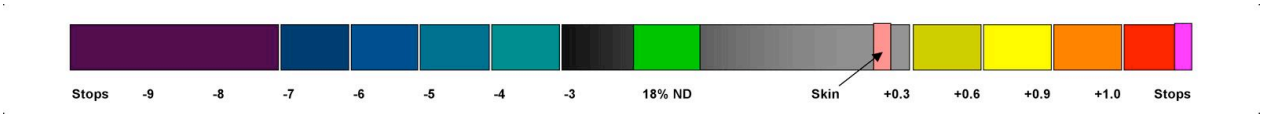
Color: When checked, forces the RED-EVF and RED-LCD outputs to monochrome or a false color exposure assist or Edge Highlight

In **Monochrome**, the color component of the image is removed.

In **False Color** the color component of the image is replaced by an overlay of colored bands representing the exposure levels with the image. Bluer colors represent underexposed areas, green is 18% ND, yellow and red colors represent more exposed areas.



This image reflects the following mapping relative to stops of exposure and 0 - 108 IRE. Note the green and pink bars that allow quick exposure setup for 18% ND and skin tones.



This is the corresponding white balanced but otherwise unprocessed, source image – captured at late morning at exposure index A320, 24fps, 1/48th sec shutter and no filtering.

Note the transition of false color in the clouds, indicating clip point was almost reached, the light grey chair is exposed at approximately 18% gray, and the foliage falls in the shadows.

Edge Highlight

With **Edge Highlight** selected, items that are in focus are outlined in red over monochrome.

Analysis Menu

Meter: allows the operator to choose an “always on” signal analysis. Selections include Spot Meter, Luma Histogram, RGB Histogram and MONO (RGB without color) Histogram.
If **Spot Meter** is selected, a red rectangular box will appear centered on the center cursor of the image. The size of this sample box can be adjusted by rotating the Joystick, and its location can be adjusted by moving the joystick in X and Y directions. Press the joystick to fix the sample box. The average IRE value of the pixels in the sample box is shown in the lower section of the full camera display.

If **Luma**, Mono or RGB Histogram is selected, a corresponding histogram illustrates the exposure distribution. A Clip Meter (like a traffic light – but red, blue and green) compliments the histograms. When either of the R, G, and B channels have 1% of their pixels at maximum (clip) value, the corresponding channel clip light will illuminate.

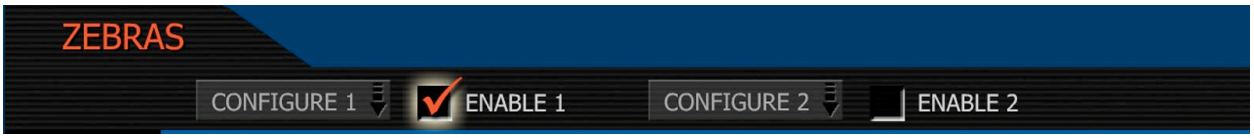
Assists: allows the operator to choose a signal analysis waveform. Selections include Waveform Exposure, RGB Parade Histogram, Focus Assist and Focus Overlay.

If **Waveform** is selected, a color-coded waveform illustrates the exposure values using the full width of the lower section of the camera display. As exposure reaches maximum, waveform color changes to yellow and then red. At minimum exposure, the waveform color changes to light blue then dark blue. These colors match those used in the False Color Meter.

If **RGB Parade** is selected, a corresponding histogram illustrates the exposure distribution in the R, G and B channels using the full width of the lower section of the camera display.

If **Focus Assist** or **Focus Overlay** is selected, a full screen width red rectangular box will appear centered on the center cursor of the image. The vertical position of this sample box can be adjusted by rotating the Joystick, and its height can be adjusted by moving the joystick left or right. Press the joystick to fix the sample box. The average focus value of the pixels in the sample box are shown in a full width graph restricted to the lower section of the camera display (Focus Assist) or overlaid in the lower section of the active video (Focus Overlay)

Zebras: To adjust Zebras, highlight the ZEBRA label, and then push the joystick.



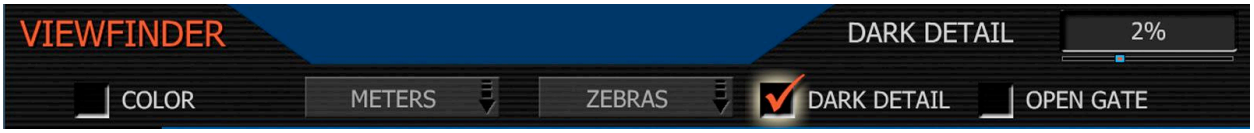
Zebras: enables and adjusts the upper and lower values for two independent Zebra indicators. One zebra may be used for highlight exposure, and the other for mid tone or shadows.

Zebra 1 default settings are for highlight indication with LOW IRE at 90 and HI IRE at 108.

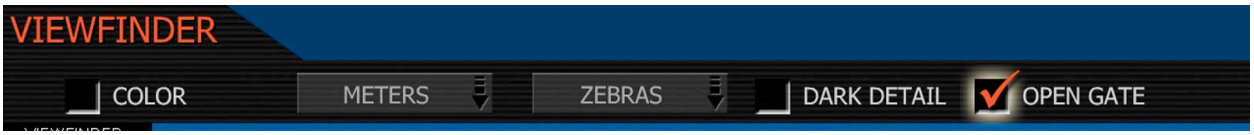
Zebra 2 default settings are for 18% gray indication with LOW IRE at 44 and HI IRE at 47.

To use Zebra 2 as a shadow exposure indicator, set Zebra 2 LOW IRE to 0 and HI IRE to 5. This corresponds to Dark and Medium Blue in the False Color Meter

Areas of the image exposed within these ranges will be indicated by crosshatched overlays. Zebra 1 crosshatch pattern is oriented NW/SE and Zebra 2 is oriented NE/SW. Where the Zebras overlap, Zebra 1 has display priority.



Dark Detail: allows the RED-EVF to view addition information (detail) in dark areas of a scene, or in dimly illuminated nighttime scenes. Default setting is ON, and 1%



Open Gate: lets the camera preview images at 48Hz (50Hz) update rate when operating in 23.98 or 24.00 fps (25 fps) Project Frame Rates. In record, all monitor path images will be viewed at 48Hz, but recorded at 23.98 or 24.00 fps (viewed at 50Hz, recorded at 25 fps)

Note: Use Open Gate with caution. Due to the doubling of sensor frame rate relative to capture rate the following operational restrictions should be noted.

- **Open Gate is not available in Varispeed or Ramp modes.**
- **Open Gate is not available for 50.00 or 59.94 Project Frame Rates.**
- **Video Genlock may not be available when operating in Open Gate.**
- **360-degree shutter is not available when operating in Open Gate.**

Note: When deselecting Open Gate mode, it is normal to observe up to a 3 second disruption in the RED-EVF display.

Audio:

This sub menu allows microphone input levels to be adjusted via a high quality pre-amplifier.

Audio is sampled at 24bits, which provides high audio fidelity and wide dynamic range. Each microphone input is provided with a pre-amplifier that maybe adjusted for optimal level to match different microphone sensitivities and sound pressures.

Input Level.	Microphone: Range +10dB to +54dB		Default value is +32dB
	Line:	0dB or + 10dB	Default value is 0dB

Note: Input level range on cameras shipped prior to Sept 15 2008 is +20dB to +54dB. Line input levels may not be adjusted on these cameras, unless the audio board is upgraded.

Microphone Input Levels

Recorded levels are affected by the gain setting of the microphone input preamplifier.

For example:
at +20 dB the microphone input level equivalent to Full Scale is -7 dBu (0.36 Volts RMS)
at +54 dB the microphone input level equivalent to Full Scale is -36 dBu (0.013 Volts RMS).

Line Input Levels

Recorded levels follow the level of the incoming signal when Gain is set to 0dB.

At 0dB, the input level equivalent to Full Scale is +18 dBu (6.5 Volts RMS).

To achieve 14 dB of input headroom set the nominal input to +4 dBu (1.3 Volts RMS).

Note: Input Gain may also be set to +10dB if working with consumer line level equipment.

Headphone

The sub menu provides controls for headphone output volume channel mixing.

Master Volume: Adjusts the overall headphone volume.

Range is -18dB to 0dB in 1dB steps. Default is -6dB.

Volume Left, Volume Right: Adjusts volume for the left and right sides independently.

Range is -12dB to + 6dB in 1dB steps. Default is 0dB.

Mix: Selects which audio channels feed the left and right side headphone outputs.

1L + 2R Feeds channel 1 to the left side, channel 2 to the right.

3L + 4R Feeds channel 3 to the left side, channel 4 to the right.

Quad Mix Feeds channels 1&2 to the left, channels 3&4 to the right.

8. System Menu Controls

This section describes the various controls available to configure the camera. These parameters are accessed from the SYSTEM menu key, located below and left of the RECORD button.

Sound Menu

This menu provides audio channel configuration and management.

This sub-menu allows each audio channel to be enabled, to do so press REC ENABLE

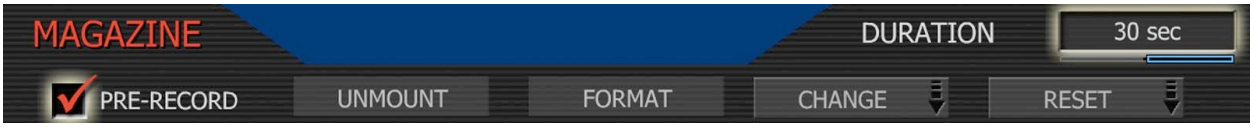
Once enabled, an input type may be selected – either Line or Microphone.

Phantom power may be independently enabled for any inputs selected as Microphone.

Note: the +48V Phantom Power output is disabled each time the camera is power cycled.

Media Menu

This menu provides various media management functions including digital media formatting.



Selections are PRE-RECORD, UNMOUNT, FORMAT, CHANGE and RESET

Pre-record: enables a continuous loop recording of definable duration (10 or 30 seconds) that permits continuous video and audio capture “before the event” i.e. before RECORD is pressed.

When enabled, pre-record starts recording 1-second chunks of video and audio to the digital magazine. At the end of the selected pre-record period, the first chunk is overwritten.

If the RECORD button is pressed while in pre-record, pre-record mode is terminated and a normal record is enabled. The timecode value and clip name are carried over between modes.

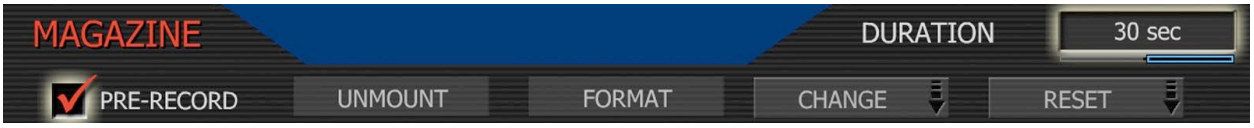
A typical clip folder in this scenario looks as follows –

A001_C001_0519L7.RDC	Today, 6:35 PM	--	Folder
A001_C001_0519L7_001.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_002.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_003.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_004.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_005.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_006.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_007.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_008.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_009.R3D	Today, 6:35 PM	17.9 MB	RED RAW R3D
A001_C001_0519L7_010.R3D	Today, 6:35 PM	17 MB	RED RAW R3D
A001_C001_0519L7_011.R3D	Today, 6:35 PM	118.4 MB	RED RAW R3D
A001_C001_0519L7_F.mov	Today, 6:35 PM	64 KB	Quick... Movie
A001_C001_0519L7_H.mov	Today, 6:35 PM	64 KB	Quick... Movie
A001_C001_0519L7_M.mov	Today, 6:35 PM	64 KB	Quick... Movie
A001_C001_0519L7_P.mov	Today, 6:35 PM	64 KB	Quick... Movie

This specific clip includes eleven .R3D files, the first ten of which correspond to the pre-record and the eleventh file corresponds to the normal record period. All have the same clip name.

Note: On playback on camera or in the RED Alert!™, RED-CINE™ or any QuickTime application, these eleven individual .R3D files are seen as a single continuous video clip.

To enable Pre-Record - Enter SYSTEM menu then the MEDIA submenu.



Check the Pre-Record checkbox and select duration of 10 seconds or 30 seconds.

To commence pre-record, press both the UNDO key and the RECORD key. The camera will commence prerecord, indicated by the record tally light and timecode changing to yellow.

To enter record, press the RECORD key. This will be indicated by the record tally light and timecode changing to red. To terminate pre-record, press the RECORD key a second time.

Note: When using Pre-Record, the Edge Code written to the digital magazine can become discontinuous between clips, however Time Code is unaffected.

Unmount: select to un-mount digital media from the RED ONE™ camera in a failsafe manner. The camera operating system will ensure that all files are closed, hard disk heads (if present) are parked, and CF card or RED-DRIVE™ magazine is properly powered down.

Format: select to format digital media. The camera will warn that "all data will be erased", and formatting require that a sequence of confirm commands are made before proceeding.

Change: select this function if you wish to change the reel number allocated by the camera when media is formatted. Choose any reel number between 1-999, and then press FORMAT. If the magazine is not empty, a warning and conformation screen will appear, press FORMAT or CANCEL as appropriate.

Note: The default reel number offered by the camera will be the last used value the camera used as the reel number - e.g. if the last used reel number was 56, the change number suggested by the camera will also be 56.

Reset: select this function if you wish to reset the reel number counter used by the camera to allocate reel numbers when the media is formatted. Choose any reel number between 1-999, and then press FORMAT. If the magazine is not empty, a warning and conformation screen will appear, press FORMAT or CANCEL as appropriate.

Note: The default reel number offered by the camera will be 1. The camera no longer resets this value each time the Project Time Base (formerly Frame Rate) is changed. With Build 16 firmware the reel number counter must be manually reset at the start of each new project.

Note: To protect against duplicate magazine and file names, the camera inserts a random two digit alphanumeric number in the file and/or directory names.

For example – if we re-use 2 as the digital magazine number (reel number)

In format: Camera Letter + Reel Number + Clip Number + Month + Day + **

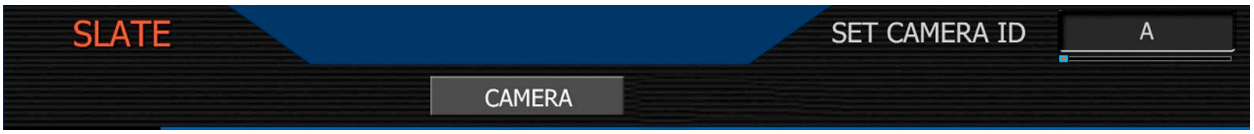
A001_C002_0515A6.RDC is unique compared to A001_C002_0515F4.RDC

Project Menu

The project menu sets the operating parameters the camera will use for a given project.

Selections are SLATE, CONFIGURE, TIMECODE and QT PROXIES

Slate lets the operator identify the specific camera used for the project. Combined with reel numbers and clip numbers assigned by the camera, all clips recorded on the digital media may be uniquely identified, simplifying post-production and media archiving workflows.



Camera: is a single letter (A-Z) that provides a unique identifier for the camera in a multi-camera production environment. The default camera identifier is A.

When you push record, the camera names the clip being recorded on the digital media.

E.g. A001_C001_0515A6.RDC

Where: A = camera A, 001 = reel 001, C001 = clip 001, and 0515 = May 15 and A6 is a two digit alphanumeric random number generated by the camera. This number helps avoid duplicate file names if two cameras are inadvertently named A on the same project.

Configure: defines the operation of the camera in a project.

Quality. Choose between REDCODE™ 28 and REDCODE™ 36. Default is REDCODE™ 36.

Note: REDCODE™ 36 will limit maximum frame rate and resolutions available using CF cards.

Time Base: allows the user to set the project time base - the playback & editing frame rate.

Resolution. Choose 4K, 3K or 2K resolutions. Do not use 4K or 3K for S16mm/B4 lenses.

The maximum available time base supported by each media type for each resolution is -

REDCODE™ 28	RED 8GB CF	RED 16GB CF	RED-DRIVE	RED-RAM
2K 2:1	60 fps	60 fps	60 fps	60fps
2K 16:9	60 fps	60 fps	60 fps	60fps
3K 2:1	50 fps	60 fps	60 fps	60 fps
3K 16:9	30 fps	50 fps	50 fps	50 fps
4K 2:1	25 fps	30 fps	30 fps	30 fps
4K HD	25 fps	30 fps	30 fps	30 fps
4K 16:9	25 fps	30 fps	30 fps	30 fps

REDCODE™ 36	RED 8GB CF	RED 16GB CF	RED-DRIVE	RED-RAM
2K 2:1	60 fps	60 fps	60 fps	60fps
2K 16:9	60 fps	60 fps	60 fps	60fps
3K 2:1	30 fps	30 fps	50 fps	50 fps
3K 16:9	30 fps	30 fps	50 fps	50 fps
4K 2:1	25 fps	30 fps	30 fps	30 fps
4K HD	----	25 fps	30 fps	30 fps
4K 16:9	----	25 fps	25 fps	25 fps

Note: Frame rates of “30” and “60” should be read as “29.97” and “59.94” respectively.

Note: Valid combinations of Quality, Resolution and Time Base are indicated by the phrase VALID SETTINGS. If this is crossed through, it indicates the media is too slow to record that combination of resolution, project frame rate and quality.

Note: An individual project should only use one Time Base, as it defines the frame rate used for timecode and editing. To vary the capture frame rate above or below the base frame rate defined by the project's time base, enable VARISPEED in the SHUTTER menu.

Timecode: select to change displayed timecode track, force Jam sync or reset camera clock.

Jam Sync: instructs the camera to replace its internal Time of Day value with external time-code read from the 5pin LEMO connector. This value is updated at the first frame of each recording, provided a valid external timecode source is present. If the external source is not present, the camera auto-increments the timecode until the external source is re-connected.

Time Code Output: when un-checked, timecode is disabled on the 5-pin LEMO timecode I/O connector. If checked, the current Time Code value is provided on the 5-pin LEMO timecode I/O connector. Time Code is always embedded in HD-SDI irrespective of this setting.

Cross Jam: activates 23.98 from 29.97 fps time code sync. The RED-ONE camera will accept a 29.97 fps time base external Time Code signal and generate a synchronized 23.98 Time Code signal for use with the camera's 23.98 fps recording. Normally used with OUTPUT off.

Cross Gen: activates 29.97 from 23.98 fps time code sync. The RED-ONE camera will generate a 23.98 Time Code signal for use with the camera's 23.98 fps recording, and also generates a synchronized 29.97 fps Time Code signal for use by an external device, available as an output from the 5-pin timecode I/O connector. Normally used with JAM SYNC off.

Display: lets the operator select whether Edge Code or Time Code is displayed in the status displays. This selection also determines which of the two recorded timecode tracks will be used in the QuickTime reference movies, and the primary timecode track in HD-SDI outputs.

If Edge Code is selected, “E” precedes the value shown in the status display. If Time Code is selected, "T," precedes the value shown in the status display. Default setting is Time Code.

Timezone: Applies a time offset to the SET CLOCK value established for the camera.

If camera date and Time are set to GMT, and then set TIMEZONE to –8 for West Coast US (Pacific) time etc. Or set to local time, and then set the TIMEZONE value to 0.

QT Proxies

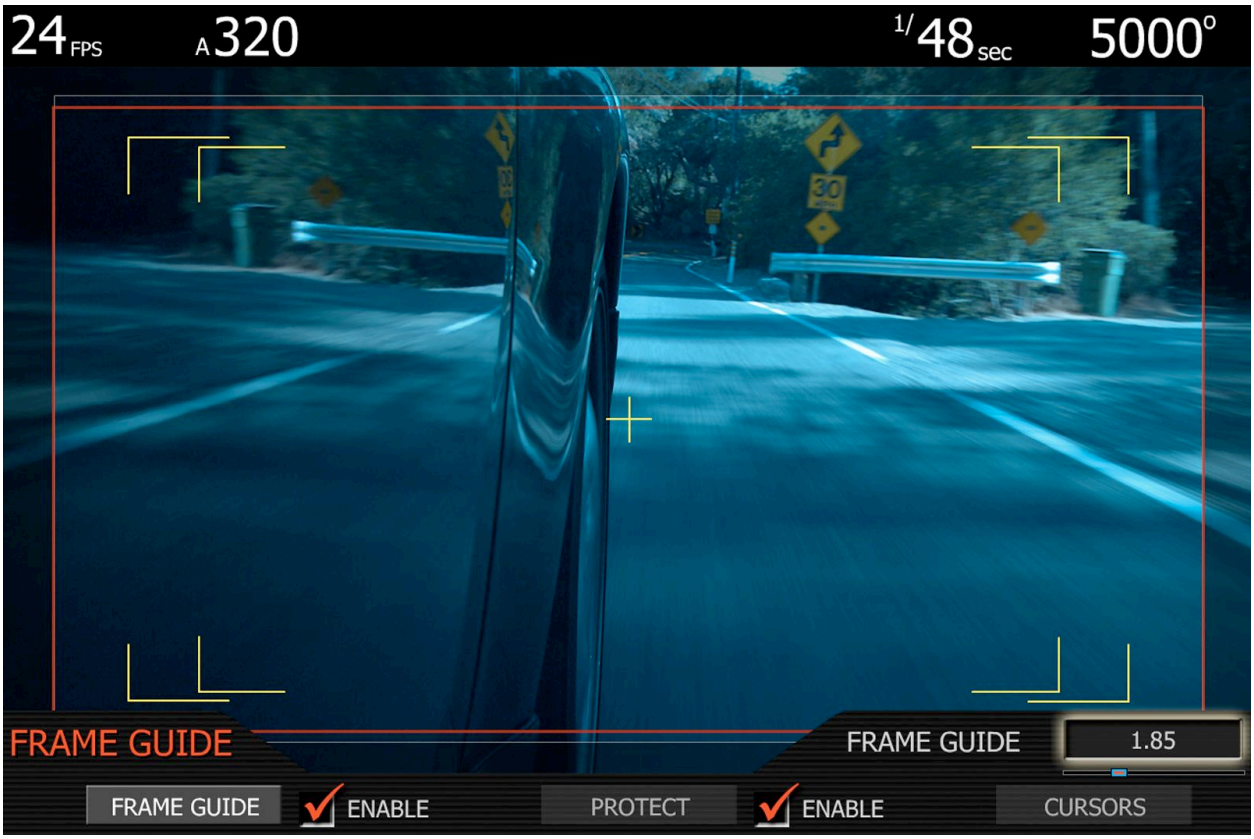
When checked, the camera will create a QuickTime reference movie at the completion of each clip record. These movies are placed in the same folder as the .R3D file. While the movies are being created the camera reports “POST” in the status display.

Monitor

The monitor menu provides controls for the framing guides and test patterns.

Selections are FRAME GUIDE, ACTIVE, TEST SIGNAL, HD-SDI and EVF REFRESH

Frame Guide: This sub-menu provides a selection of frame guides and safe action and safe title guides. User definable safe action and safe title guides may be saved as a USER PREFERENCE, thereby permitting the camera guides to be fully customized for any application.



Frame Guide: displays film projection areas with 1.85 or 2.40 aspect ratios and television display areas with 16:9 or 4:3 aspect ratios. Frame Guide color can be set to White, Black, Blue, Yellow or Red for maximum color contrast with the scene you are shooting.

Protect: displays film projection safe areas with 1.85 or 2.40 aspect ratios and television safe areas with 16:9, 14:9 or 4:3 aspect ratios, or User Areas. Safe area color can be set to White, Black, Blue, Yellow or Red for maximum color contrast with the scene you are shooting.

PROGRAM allows the use to program the specific PROTECT areas to be used.

Press the PROGRAM key to access the sub menu.

Press **Cursors** to enable Center, Safe Action or Safe Title cursors. Press **User Action** or **User Title** to program new User Action or Title areas.

Cursors: enables Center, Safe Action, Safe Title and Image Center cursors.

Cursor: Enables / disables image center cursor.

Action: Enables / disables guide. Style may be specified as a corner marker or a rectangle.

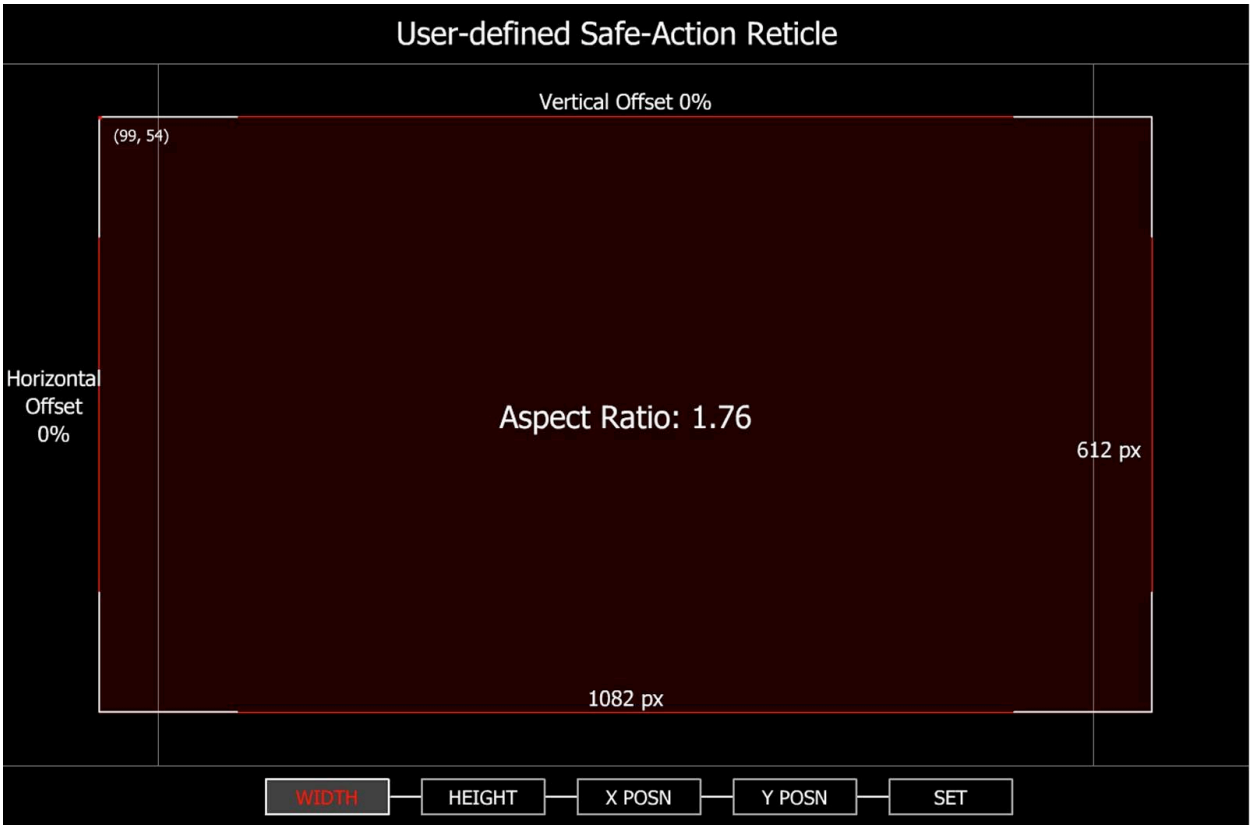
Title: Enables / disables User guide. Style may be specified as a corner marker or a rectangle.

User Action: press to program a custom Safe Action area. Area may be adjusted for width, height, and center offset. User Action values may be saved in USER PREFERENCE files.

Width: Adjusts the width of the guide. Maximum width of the guide is 1280 pixels.

Height: Adjusts the height of the guide. Maximum height of the guide is 720 pixels.

Note: The camera will display the aspect ratio of the guide based on these two values.



X POSN: Adjusts the horizontal center position of the guide.

Y POSN: Adjusts the vertical center position of the guide.

Set: Press **SET** to save these parameters to non-volatile memory and exist this menu.

User Title: enables the user to program a custom Safe Title area. Operation is the same as for USER ACTION areas. See above description.

Preview

This sub-menu selects the operating mode of the HD Preview output.

If only one of either a RED-EVF or RED-LCD are present, the HD-SDI and HDMI outputs will support Surround View, frame guides and safe action / title overlays, waveforms overlaid on a 1280 x 720 pixel video signal. Both of theses outputs include up to 4 channels of 24-bit 48KHz

audio. The HDMI output is compatible with HDMI equipped 720p and 1080p HDTV monitors.

As a user choice, the HDMI (but not the three HD-SDI outputs) can support a 1280 x 848 pixel output with Surround View, frame guides and safe action / title overlays, waveforms, and camera status and operation menus. This signal is compatible with most DVI equipped SXGA computer monitors, but is not compatible with HDMI equipped 720p or 1080p HDTV displays.

If both a RED-EVF and RED-LCD are present, the HD-SDI and HDMI outputs will be forced to 1280 x 720 (with Surround View) irrespective of the Preview Output parameter setting.

Note: The video format of the HD-SDI Preview output will also be affected by the HD-SDI refresh rate and PLAYBACK resolution selections described elsewhere in this guide.

To select between 720p and 848p output options, select VIDEO (720p) or MENUS (DVI). The default is VIDEO (720p) The Preview output setting will be held in camera memory.

Test Signal

Permits the video monitor outputs to be replaced with a video test pattern.

To enable/disable a test signal check the box.

Available test signals include: SMPTE Bars, Black Field, White Field, Loma Ramp, Chroma Ramp, Chip Chart and Focus Pattern. The RED ONE™ test signals are not recordable, they are provided to help align external video monitors connected via the HD-SDI or HDMI outputs.

SMPTE Bars with Pluge

HD-SDI

Sets the1280 x 720p HD-SDI and HDMI monitor signal update rate to 50.00 or 59.94 Hz.

The default is 59.94 (720p 59.94) If in Europe you may wish to select 50.00 (720p/50.00)

HDMI

The camera includes a standard HDMI connector on its right side panel. This output provides a HDTV compatible 1280 x 720 video signal or P.C monitor compatible 1280 x 848 pixel signal.

Note: If the PLAYBACK resolution is set to 1080p in the PLAYBACK menu, the HDMI output is 1280 x 720 pixels when in preview and record, but switches to 1920 x 1080 pixels in playback.

EVF Refresh

EVF Refresh: permits the operator to select the display refresh rate used by the RED-EVF.

The default mode is FIXED, which uses 2:3 or other appropriate pull down as required to display images at a fixed frequency of 59.94 Hz (or 50Hz) at all image capture frame rates. This mode minimizes display flicker, but will exhibit a 2:3 motion stutter on 24fps images.

The alternative mode is SYNCED. This avoids 2:3 pull down, and instead doubles the capture frame rate – for example displaying 24fps images at 48Hz (50Hz for 25.00 fps). The display may exhibit luminance flicker due to the lower frame update rate, but it will not stutter.

Note: When in SYNCED mode - EVF display may blank for up to 3 seconds

- when existing OPEN GATE mode

- after exiting MAGNIFY mode when in 4K record resolution

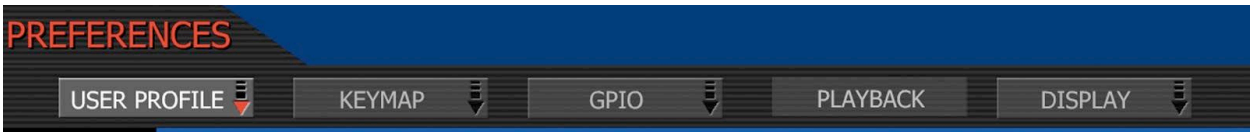
- after changing between certain Varispeed frame rates

Setup

This menu permits a variety of system maintenance tasks to be accomplished.

Selections are PREFERENCES, MAINTENANCE, SET CLOCK, WRITE LOG and REMOTE

Preferences: permits the user to define system preferences.



Selections are USER PROFILE, KEYMAP, GPIO, PLAYBACK, and DISPLAY

USER PROFILE provides controls that affect the User Profile.

Choices are CLEAR, IMPORT and EXPORT

CLEAR – allows a User Profile to be cleared from memory.

IMPORT – allows a User Profile to be read from the SD card.

EXPORT - the current USER PROFILE parameters are stored to the SD Card. The camera generates a file name of the format PROFLE_**.RPF

You may edit USER PROFILE filenames on a computer, but do not change its extension (.RPF) or the camera will not recognize it. Restrict file names to 12 characters.

KEYMAP selects the Key Map Preferences sub-menu. This menu permits selected menus or functions to be mapped to specific User Keys on the camera body.

Side Record: When checked, the side RECORD key is enabled. Default is enabled – Record

USER KEYS: When pressed permits USER KEYS 1 thru 5 to be programmed.

User-1: When checked USER-1 key is enabled, and its function is defined in the associated list. Default is Enabled - **Auto WB**. User Key 1 is the upper user key on the camera side.

User-2: When checked USER-2 key is enabled, and its function is defined in the associated list. Default is Enabled - **Magnify.** User Key 2 is the lower user key on the camera side.

User-3: When checked USER-3 key is enabled, and its function is defined in the associated list. Default is enabled – **Assist**. User Key 3 is the upper user key on the RED-EVF

User-4: When checked USER-4 key is enabled, and its function is defined in the associated list. Default is enabled – **Meter.** User Key 4 is the lower user key on the camera side.

User-5: When checked USER-5 key is enabled, and its function is defined in the associated list. Default is enabled – **Meter**. User Key 5 is the left hand side key on the RED-LCD

Available functions that may be allocated to the User Keys are –

Record	Initiates camera record start / stop
Magnify	Initiates camera monitor path magnify function
Auto WB	Initiates camera Auto White Balance
Color	Toggles the EVF Color selection On/Off
View RAW	Toggles VIEW RAW selection On/Off
Meter	Toggles the EVF Meter Assist selection On/Off
Ramp	Initiates Variable Speed Ramp

Timelapse	Initiates Timelapse Record Mode
Zebra 1	Toggles Zebra 1 On / Off
Zebra 2	Toggles Zebra 2 On / Off
+ Volume 1	Increases volume of Channel 1 (when in microphone mode)
- Volume 1	Decreases volume of Channel 1 (when in microphone mode)
+ Volume 2	Increases volume of Channel 1 (when in microphone mode)
- Volume 2	Decreases volume of Channel 1 (when in microphone mode)
+ ISO	Increases camera Sensitivity
- ISO	Decreases camera Sensitivity
+ Shutter	Increases camera Shutter Speed
- Shutter	Decreases camera Shutter Speed

GPIO selects the GPIO Preferences sub-menu.

This menu permits the function of GPI A and B defined as either -

Record: starts standard mode (video and audio) record. Subsequent trigger stops record.

Pre-Record: activates Pre-record. Subsequent triggers start / stop record.

Timelapse: activates Timelapse. Subsequent trigger activates one-shot or burst recording.

Ramp: initiates variable frame rate ramp speed change.

Shut Down: initiates a controlled camera power down

Play Clip: causes the selected Clip to play back at normal speed

Next Clip: cues the selected clip to end. If at end, cues to beginning of next clip.

For GPI A the factory default is **Record** and for GPI B factory default is **Timelapse**.

POLARITY selects the Polarity Preferences sub-menu.

This menu permits the signal polarity of GPI A and B and GPO A and B to be defined as either – Active LO or Active HI. Selection is independent for each GPI input and GPO output.

For GPI signals Active LO is the default, which means the GPI command will be activated on a high to low edge of an external control pulse. Set to Active HI to use a low to high edge.

For GPO signals Active HI is the default, which means the GPO tally output will be high when in normal, burst or ramp record modes, and low when not. Set to Active LO to reverse this.

PLAYBACK: selects the Playback Video Format sub-menu.

This menu permits the video format and look used by the camera on playback to be specified.

MODE: permits the video format used by the camera on playback to be specified.

720p: Video output is 1280 x 720 pixels. For 4K images the monitored image width corresponds to 4,096 pixels scaled down to 1280 pixels. This signal is available on the HD Preview (HD-SDI and HDMI), HD Program (Dual Link HD-SDI), RED-EVF and RED-LCD outputs.

1080p: Video output is 1920 x 1080 pixels. For 4K images the monitored image width corresponds to 3,840 pixels scaled down to 1920 pixels. This signal is available on the HD Preview (HD-SDI and HDMI), HD Program (Dual Link HD-SDI), RED-EVF and RED-LCD outputs. RED-EVF and RED-LCD will display a 1280 x 720 pixel center cut of the larger 1920 x 1080 image.

LOOK: permits the look used by the camera on playback to be specified.

CAMERA: forces the camera to use current LOOK values to color process recorded RAW data files when played back on-camera.

CLIP: forces the camera to use recorded LOOK metadata values to color process recorded RAW data files when played back on-camera.

DISPLAY: This menu permits specific elements of the GUI to be disabled.

Selections are – SHUTTER, LENS DATA, EVF MENU, STATUS and GREY SCALE

Shutter: When checked, displays frame rate and sensor status on GUI upper edge. Also allows the user to choose if camera shutter value is reported in Degrees or 1/Seconds format.

Note: Shutter values are always input in 1/seconds format, irrespective of this choice.

Lens Data: When checked displays focus / zoom / iris data on GUI mid-upper edge. Also allows the user to choose if Distance is reported in Feet or Meters.

EVF Menu: When checked displays EVF menus data on left edge of camera GUI

Status: When checked, displays media, exposure and audio status on GUI lower edge.

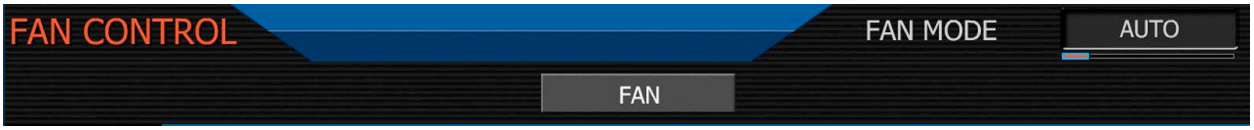
Grey Scale: When checked, displays an 11 step grey scale on GUI right edge.

Note: Disabling a GUI element disables it on all monitor outputs, and disabling the EVF Menu display also disables the EVF menu controls.

MAINTENANCE

This sub-menu defines how the cooling fan behaves, and enables software updates.

Fan Sub Menu: specifies how the cooling fan operates.



The camera's fan speed can be changed depending on the ambient air temperature and recording application. The default setting is AUTO

Auto: This setting combines VARIABLE speed fan operation while not recording, with SILENT mode when in record. This mode is recommended for extended duration dialog recordings.

Variable: This setting is most useful when the ambient temperatures is below 50°F/10°C. In variable mode, the fan runs at a continuously variable speed in both preview and record. At low ambient temperatures the fan will run at minimum speed. At higher ambient temperature, the fan will run faster to maintain the camera body within its operating temperature limits.

Hot: This setting is most useful when the ambient temperature is between 86°F/32°C and 104°F/40C. In hot mode, the fan runs at its maximum speed. Other camera cooling precautions may be necessary, such as shading the camera from sunlight and use of a cold gel pack.

Standard: This setting is most useful when the ambient temperature is below 86F/ 32C. In standard mode, the fan will run at half its maximum speed when in record.

Quiet: This setting is most useful when the ambient temperature is below 72°F/25°C. In quiet mode the fan runs at one quarter its maximum speed when in record.

Silent: This setting is most useful when the ambient temperature is below 60°F/15°C. In silent mode the fan runs at its minimum speed when in record.

Black Shading: allows the camera to self-calibrate sensor output for optimum black levels.

Note: before starting a Black Shading calibration, ensure that you place a lens cap that blocks all light on your lens. Insert a formatted CF card into the camera (or attached a formatted RED-DRIVE). Ideally re-format the media before proceeding to ensure sufficient space is available to perform the record task.

Note: It is very important that no light reaches the sensor. If Black Shading is performed without capping the lens, the black level calculation will be incorrect. To rectify, repeat the Black Shading procedure with a lens cap installed.

Press the BLACK SHADING button, and the camera monitoring outputs will report -

Start Restore

Press the START button, and the camera monitoring outputs will report -

You are about to modify the camera's factory calibration. You should take this step only when advised to do so by a factory representative.

Before continuing, make sure the lens cap is securely in place.

The sensor must remain unexposed to light for the duration of this process.

O.K CANCEL

Press the O.K button, and the camera monitoring outputs will report –

Starting Black Shading Calibration

The camera will then enter the Record mode, and any camera monitoring outputs will report

Calibration: Analyzing Sensor (99)

The camera records 100 frames of sensor data that is used to analyze the precise black level of each pixel. This will take about 2 minutes. After that time the camera will report -

Black Shading: Preparing / Merging / Calculating / Writing

Finally the camera will report –

Black Shading: Installing

Installation of the new data takes about 3 minutes. The camera will then report –

Black Shading & Calibration was successful.

Please reboot the camera for the new settings to take effect

O.K

Press the joystick and power cycle the camera. This completes the Black Shading procedure.

Restore: permits camera configuration and setup data to be reset to factory default values.

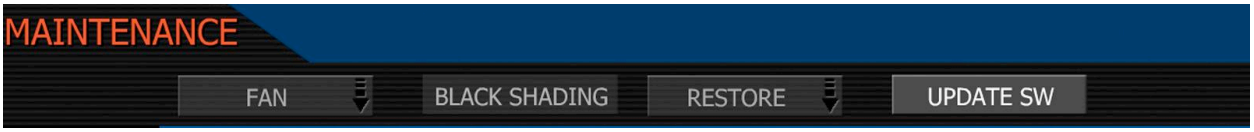
System – Allows all camera configuration parameters to be reset to the factory default values.

Look – Allows all image processing parameters to be reset to the factory default values.

User - Allows all user preference parameters to be reset to the factory default values.

Restore – Press the RESTORE key to confirm the above selections.

Update SW: initiates a camera software update.



Details of the upgrade procedure are provided in the following section of this Guide

Set Clock: allows the camera's real time clock to be adjusted.

Set Date and Time to equal GMT, and then set TIMEZONE in the TIMECODE menu to –8 for West Coast US (Pacific) time. Or set to local time, and then set the TIMEZONE value to 0.

Year – allows the operator to enter a new value for the year Range 2007 - 2020

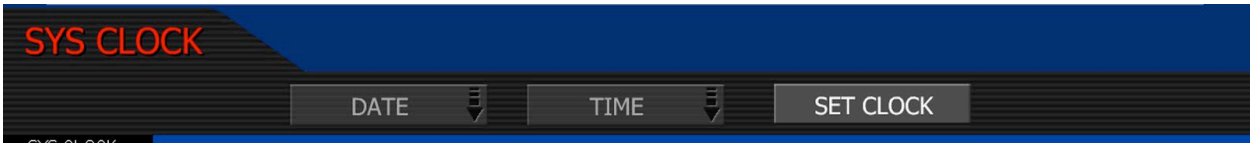
Month – allows the operator to enter a new value for the month Range 1 - 12

Day – allows the operator to enter a new value for the day. Range 0 - 31

Hours – allows the operator to enter new value for hours (24 hour format) Range 0 - 23

Minutes – allows the operator to enter new value for minutes. Range 0 - 59

Seconds – allows the operator to enter new value for seconds. Range 0 - 59



Set Clock – loads the selected Date and Time parameters into the camera's system memory.

Note: After pressing this key the camera will re-boot. The new parameters will take effect, and be visible as TIME CODE, on completion of the re-boot cycle.

WRITE LOG: select to write camera's .LOG file to CF card or RED-DRIVE™ magazine. The .LOG file is a diagnostic tool that can assist RED with camera troubleshooting. After capture, upload the .LOG file to the RED customer service team contactable at www.red.com/support

REMOTE: This menu provides access to controls that specify the operation of the remote ports on the camera. At this time there is a single selection - **S4/I**.

S4/i

Check the S4/i box to enable communication between the RED ONE™ and an S4/i compatible lens, and to enable recording of the lens data as metadata in the RED ONE™ .R3D files.

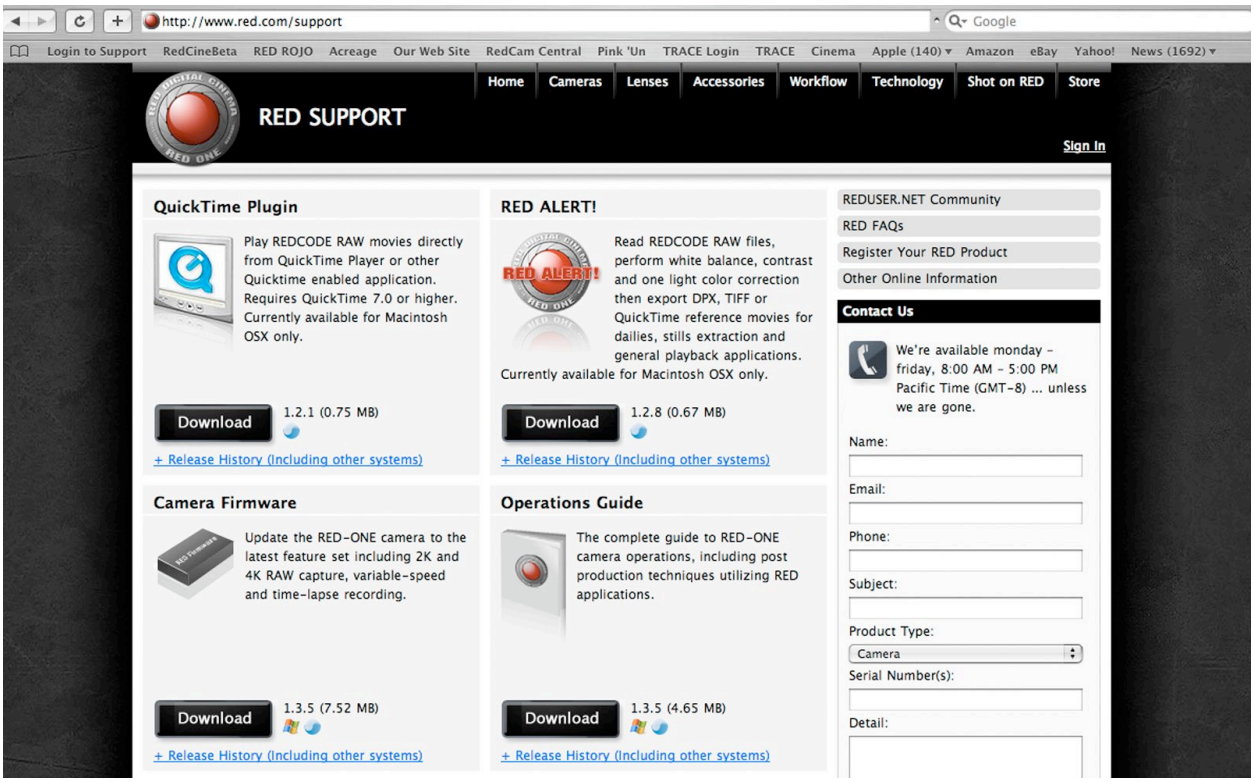
To enable the display of Focus / Zoom / Iris data from the S4/i lens, also check the LENS DATA checkbox located in SYSTEM / SETUP / PREFERENCES / DISPLAY menu.

Note: S4/i communications requires appropriate hardware to be present in the camera body and P/L lens mount. Cameras shipped prior to Sept 15 2008 will require a factory installed hardware upgrade to enable this function.

Appendix A: Upgrading Camera Firmware

RED ONE camera functionality may be upgraded by installing the latest firmware.

Log onto www.red.com/support for a complete listing of firmware revisions available for the camera, complementary QuickTime codec, postproduction software, and Operation Guide.


http://www.red.com/support
Home
Cameras
Lenses
Accessories
Workflow
Technology
Shot on RED
Store
RED SUPPORT
Sign In
QuickTime Plugin
Play REDCODE RAW movies directly from QuickTime Player or other Quicktime enabled application. Requires QuickTime 7.0 or higher. Currently available for Macintosh OSX only.
Download
1.2.1 (0.75 MB)
+ Release History (including other systems)
RED ALERT!
Read REDCODE RAW files, perform white balance, contrast and one light color correction then export DPX, TIFF or QuickTime reference movies for dailies, stills extraction and general playback applications. Currently available for Macintosh OSX only.
Download
1.2.8 (0.67 MB)
+ Release History (including other systems)
REDUSER.NET Community
RED FAQs
Register Your RED Product
Other Online Information
Contact Us
We're available monday – friday, 8:00 AM – 5:00 PM Pacific Time (GMT-8) ... unless we are gone.
Name:
Email:
Phone:
Subject:
Product Type:
Camera
Serial Number(s):
Detail:
Camera Firmware
Update the RED-ONE camera to the latest feature set including 2K and 4K RAW capture, variable-speed and time-lapse recording.
Download
1.3.5 (7.52 MB)
+ Release History (including other systems)
Operations Guide
The complete guide to RED-ONE camera operations, including post production techniques utilizing RED applications.
Download
1.3.5 (4.65 MB)
+ Release History (including other systems)

Upgrade Procedure

Firmware and software identified by a build and version number. A higher number reflects a later release. The current release is identified on the home page of www.red.com web site.

To download, click on the desired release's link at ww.red.com/support. Before the download starts you will be prompted to enter your account and password or the camera's P.I.N.

Once the firmware is downloaded, you will see a new folder on your desktop. Open that folder and verify you see a read me file (containing installation instructions), and a folder called Upgrade. Now take either an SD Card or a CF card that has been formatted by the camera, and use your computer to copy the folder called Upgrade onto that SD or CF card.

Finally, un-mount the SD or CF card from the computer (i.e. drag to the trash can) and insert the SD or CF card into its corresponding slot in the camera. To initiate the upgrade, turn off the camera, wait approximately ten seconds, and then turn on the camera again.

If there is valid upgrade firmware on the SD or CF card, all monitor outputs will report back –

A software update is available for your system

Would you like to upgrade?

Upgrade Later

Press the joystick to confirm the upgrade, and all monitor outputs will report back –

Performing System Upgrade

This may take several minutes

Do not power-down during this process

A blue highlight bar will animate on all monitor outputs to indicate an upgrade is in progress. After about 5 minutes, the upgrade will have completed. All monitor outputs will report back

Upgrade Compete

Power-cycle the camera to continue

Power cycle the camera to return to normal operation. During the camera power up process, the camera will display the camera P.I.N and the firmware Build and Version number.

Appendix B: Managing Digital Media

The RED ONE™ camera supports two types of media - compact flash and hard disk.

Compact Flash (CF) media requires a RED-FLASH (CF) module mounted to the left side of the camera body. Hard disk media is housed in a RED-DRIVE™ magazine mounted to the rear of the camera body and connected via a custom16 pin SATA interface cable.

RED-FLASH (CF) compact flash media is currently available in 8GB and 16GB capacities. Record duration is dependent on resolution, quality and frame rate, but an 8GB card will typically provide 4 minutes of 24fps 4K RAW, 7 minutes of 24fps 3K RAW, or 16 minutes of 24fps 2K RAW recording. A 16GB card will provide twice this capacity.

RED-DRIVE™ media is currently available with a capacity of 320GB. Record duration is dependent on resolution, quality and frame rate, but a RED DRIVE will typically provide 160 minutes of 24fps 4K RAW, 280 minutes of 24fps 3K RAW, or 640 minutes of 24fps 2K RAW recording.

RED-RAM™ media is currently available with a capacity of 128GB. Record duration is dependent on resolution, quality and frame rate, but a RED-RAM™ will typically provide 64 minutes of 24fps 4K RAW, 112 minutes of 24fps 3K RAW, or 256 minutes of 24fps 2K RAW recording.

During a recording, the rear status screen, and monitor outputs will display the % of remaining media capacity. At 10% remaining capacity the media status box will turn yellow, at 5% it will turn red. At 2% remaining the camera will cease recording.

This reserves a small amount of capacity for ancillary data to be written to the media.

Note: Media formatted on-camera will use a name and root volume in the format:

Camera Letter + Reel Number + Month + Day + ** where ** is a two digit alphanumeric random number generated by the camera for each file e.g. A001_0512A6.RDM

Clips recorded to the media follow similar naming conventions

A001_C001_0512A6_001.RDC and A001_C001_0512A6_H.mov etc

Media Formatting

Media must be formatted prior to using it for recording. Formatting is performed on camera, although media may be erased on a Macintosh OS X personal computer, allowing the camera to just add the necessary project profile and clip log data.

Formatting on-camera

i) Formatting a new Compact Flash card or attach a RED-DRIVE™ or RED-RAM™ magazine.

Insert the CF card with the manufacturer's label facing outward (away from camera body). Press the CF firmly into the CF slot, but without excessive pressure. Or attach the RED-DRIVE™ or RED-RAM™ magazine to the e-SATA port via the 16 pin e-SATA cable provided.

The camera will recognize unformatted media and prompt with a message such as this

Unformatted and/or **Media X**

In the camera GUI display and on the rear LCD Status Display.

To format the media: From the camera back, press **SYSTEM** menu.

Then press the **MEDIA** label.

Then press **FORMAT**.

If the media is blank, the camera will respond that it is -

Formatting the Internal (External) Digital Magazine.

Once completed the following screen will appear.

The Magazine was Successfully Re-Formatted

The digital magazine is ready for immediate use

O.K

Press the Joystick to acknowledge. The format process is now complete. Formatting a CF card or RED-RAM™ will take about 10 -15 seconds; a RED-DRIVE™ formats in less than a minute.

Reformatting previously used media

Re-formatting a previously used CF card or RED-DRIVE™ or RED-RAM™ magazine follows a similar procedure, except that the camera will provides the following warning.

The Digital Magazine is not empty!

The magazine currently contains *(number)* clips.

Re-formatting the magazine will permanently erase these clips.

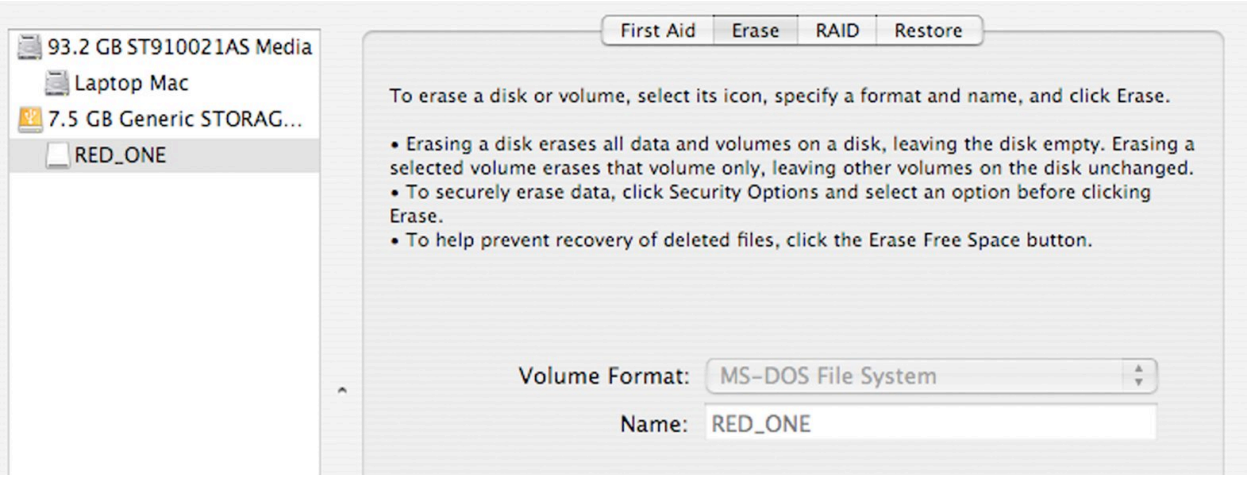
Do you wish to format this magazine?

CANCEL FORMAT

Press the Joystick to cancel and return to the main camera display, or position the joystick over the FORMAT label and press the joystick to confirm media formatting.

Erasing media on a Macintosh personal computer

On a Macintosh computer, connect the CF card via a CF card reader, or the RED-DRIVE™ or RED-RAM™ via a standard FireWire 400 / 800 cable, and then open Disk Utility.


93.2 GB ST910021AS Media
Laptop Mac
7.5 GB Generic STORAG...
RED_ONE
First Aid
Erase
RAID
Restore
To erase a disk or volume, select its icon, specify a format and name, and click Erase.
• Erasing a disk erases all data and volumes on a disk, leaving the disk empty. Erasing a selected volume erases that volume only, leaving other volumes on the disk unchanged.
• To securely erase data, click Security Options and select an option before clicking Erase.
• To help prevent recovery of deleted files, click the Erase Free Space button.
Volume Format:
MS-DOS File System
Name:
RED_ONE

Carefully choose the drive from the list and select the Erase tab. Then choose MS-DOS (FAT) as the Volume Format. You can add a Name if you wish, but the camera will overwrite this.

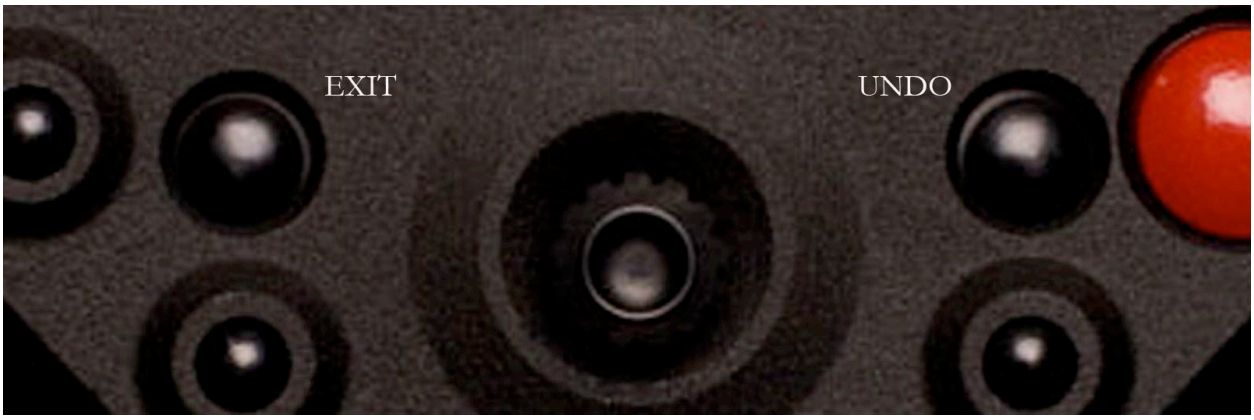
Now before proceeding, double check that this is the CF card or RED-DRIVE™ or RED-RAM™ that you wish to erase, and click the Erase key. When the pop up window appears click on the Erase button.

When the media is erased, drag its icon to the trash can and physically disconnect it.

Removing Media.

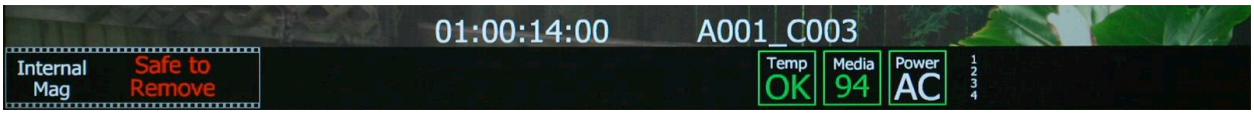
Media should be un-mounted prior to removal from the camera. This ensures power is removed from the digital media and any open data files are closed.

Removing a CF card or disconnecting a RED-DRIVE™ or RED-RAM™ without first un-mounting it will not physically damage the media, however it does increase the risk of file corruption, so it's good operational practice to un-mount the media if possible before removing / disconnecting.



To UNMOUNT the digital media follow this sequence.

- Press and hold the UNDO key and then press the EXIT key.



When the GUI status indicator displays "Safe to Remove", (Media X in the status LCD) you may remove the CF card and/or disconnect the RED-DRIVE™ magazine.

Note: Un-mounting the digital media takes a few seconds, protects the integrity of your recorded data and helps clips mount instantly to your workstation once in postproduction, so it's a recommended habit to develop. If you don't un-mount the media the camera will offer a warning – your files may not be damaged, but you will have been warned!

Note: The camera will respond to physical removal of the media without un-mounting with the following warning.

"Media removed prior to Unmount. Data Integrity Risk"

Copying Media.

When copying media, it is recommended that you drag the complete .RDM folder on the digital magazine to the archive storage media. This copies all the media and metadata files. You won't need to copy the log and magazine profile files, but if you do so, it will do no harm.

Appendix C: Input and Output Connectors.

D.C Power Input

The power input connector accepts a DC voltage between +11.5 and +17V DC. When used with a RED-BRICK 140 battery, the camera also receives battery status information. The power input is protected against reverse-polarity connection, ESD, under voltage, and over current.

Mating connector LEMO FGG.2B.306.CLAD62Z

View into camera Power Input connector

Pin	Signal	Description
1	+VBATT	Power input, +11.5 to +17VDC
2		
3	GROUND	Power Return (Camera Ground)
4		
5	SCL_BATT	Battery pack I2C bus clock
6	SDA_BATT	Battery pack I2C bus bi-directional data

WARNING: It is very important that both pairs of +VBATT and GROUND pins are wired up. DO NOT fabricate power cables with just one each of +VBATT and GROUND pins wired, as this will cause damage to the camera's power supply; this is not covered by Warranty.

Drive Interface

The Drive Interface is a custom e-SATA and power connection for RED-DRIVE™ and RED-RAM™ media. Due to the requirement for absolute data integrity that requires custom cable construction, the pin-out of this interface is not published.

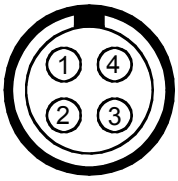
Contact RED technical support for details of available Drive Interface cable lengths.

Note: The Drive Interface and D.C Power Input connectors use the same connector shell size. It is very important you do not try to force a 16-pin Drive Interface cable into the 6-pin D.C Power connector, or 6-pin D.C Power cable into the 16-pin Drive Interface connector.

Auxiliary Power Outputs

The camera provides two auxiliary power output connectors on its back panel. Each output supplies un-regulated +11.5 to 17V battery pass-through power between pins 1 and 4. Maximum sustained current draw is 1.5 Amp per output. These power output pins are over-current protected, and are only activated by the camera on boot up. If the over-current circuits trip, power cycle the camera to re-activate the outputs.

Mating connector LEMO FGG.0B.304.CLAD42Z



View into camera Auxiliary Power Output connector

Pin	Signal	Description
1	GROUND	Auxiliary power return (Camera Ground)
2	GPI	Input (Trigger)
3	GPO	Tally
4	+VOUT	Auxiliary power output,

Functions of the GPI and GPO pins can be configured by the operator, however the default setting for the upper connector is Pin 2 = Record Start/Stop and Pin 3 = Record Tally. For the lower connector, the default setting is Pin 2 = Record Next Frame and Pin 3 = Record Completed. This preset is suitable for animation or motion control applications.

To activate a GPI trigger, momentarily short pin 2 to 1.

When active, the GPO tallies present 3.3 V @ 0.04 amps maximum between pins 1 and 3.

WARNING: If creating a GPI trigger cable is very important you do not short pin 4 to pin 3, as this will cause damage to the camera's power supply; this is not covered by Warranty.

Timecode Input / Output

This connector supports SMPTE Timecode input and output. Pins 2 and 3 may be used together to receive a balance SMPTE 12M serial time code input, or pin 2 may be used by itself (leave pin 3 open) to receive a single-ended SMPTE 12M serial time code input. Pin 5 is time code output.

Mating connector: LEMO FGG.0B.305.CLAD42Z

View into camera Timecode connector

Pin:	Signal	Description	Direction
1	Ground	Camera ground	-
2	TIMECODE_IN_P	Serial timecode input, positive	In
3	TIMECODE_IN_N	Serial timecode input, negative	In
4	-	- No connect -	-
5	TIMECODE_OUT	Serial timecode output	Out

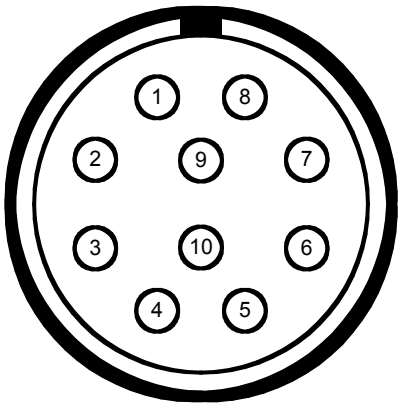
Note: Pin 4 is a no connect. Do not tie to ground.

Aux 232 Port

The Auxiliary / RS232 port provides up to 500mA of regulated +12V power to motorized 2/3" B4 mount lenses. The two inputs labeled SW1 and SW2 are GPI signals that activate Record Start / Stop and Playback of the last recorded clip respectively. These are typically triggered by the B4 lens, or by a controller such as Preston MDR-2 using an appropriate adaptor cable.

Note: Do not attempt to power a cinema lens motor from this connector. Depending on your max current requirement, extract power from either one of the two Auxiliary Power outputs, or the D-Tap connector on the battery V-Plate.

Mating connector: LEMO FHG.1B.310.CLAD62Z



View into camera Auxiliary / RS232 connector

Pin:	Signal	Description	Direction
1	GND	Camera ground	--
2	RTX	RS232 Transmit Data	Out
3	+12V	Regulated 12V output, 500mA max.	Out
4	-	-- Reserved: do not connect -	-
5	SW2	“Record Clip” switch closure	In
6	-	-- Reserved: do not connect -	-
7	SW1	“Playback Clip” switch closure	In
8	RRX	RS232 Receive Data	In
9	-	-- Reserved: do not connect -	-
10	-	-- Reserved: do not connect -	-

Note: Pins 4, 6, 9 and 10 are reserved for future use.

RED-EVF Interface

The RED-EVF interface is a custom digital video and power interconnection between the camera and a RED-EVF. Due to the data integrity nature of this interface, the pin-out is not published.

Contact RED technical support for details of available RED-EVF cable lengths.

RED-LCD Interface

The RED-LCD interface is a custom digital video and power interconnection between the camera and a RED-LCD. Due to the data integrity nature of this interface, the pin-out is not published.

Contact RED technical support for details of available RED-EVF cable lengths.

Note: The Aux 232, RED-EVF and RED-LCD connectors use the same shell size. Do not attempt to force fit a 10-pin Aux 232 cable into a 16-pin RED-EVF or RED-LCD connector, or force fit a 16-pin RED-EVF or RED-LCD cable into a 10-pin Aux/RS232 connector.

Line Level and Microphone Level Audio Inputs

A three-pin mini-XLR connector is provided for each of the camera’s Line / Microphone inputs. Audio is recorded at 24-bit 48KHz, which provides high audio fidelity and wide dynamic range. The Line Level and Microphone Level analog audio input signals are routed via a high quality A/D and pre-amplifier, whose gain stage may be controlled using the **Input Level** control to achieve the desired audio reference / recording level.

View Into Mic/Line Audio Input (3-pin Mini-XLR)

Pin:	Signal	Description	Direction
1	GROUND	Camera ground	--
2	IN+	Mic/Line input (+48V phantom power)	In
3	IN-	Mic/Line input (+48V phantom power)	In

Microphone/Line Input Signals

Line Level Audio Inputs

Line Level audio inputs are designed to operate at unity gain (0dB **Input Level**), therefore an appropriate line output level should be established by your production mixer or other signal source.

Reference signal level for Line inputs is 0dBu / 0.775 volts RMS / -20dBFS when operating at 0dB **Input Level**. The maximum input signal that can be applied before the onset of input signal clipping is +18dBu / 6.5 volts RMS / - 2dBFS. This provides a guaranteed minimum of 18dB of input signal headroom above reference, in combination with maximum Signal to Noise Ratio for the resulting 24-bit digital recording.

If a signal headroom greater than 18dB is desired, the operator may choose to use an XLR to mini-XLR adaptor cable with -4dB input signal pad available from RED Digital Cinema. This will provide a guaranteed minimum of 22dB of input signal headroom above reference, however the 24-bit digital recording level will be -4dB lower, and so delivers a reduced Signal to Noise Ratio.

Note: If sending the camera a TAPE level line output (-10dBu), adjust the **Input Level** to +10dB.

Microphone Level Audio Inputs

The 24-bit digital recording level of each Microphone Level input is affected by the sensitivity of the attached microphone and the **Input Level** setting applied to each of the audio pre-amplifiers.

Pre-amplifier **Input Level** range is +10dB to +54dB, with a default value of +32dB.

Choose an **Input Level** that aligns the input signal to the right hand reference line drawn vertically through the camera's PPM, which indicates 0dBu. This setting provides a guaranteed

minimum of 18dB of input signal headroom above reference, in combination with maximum Signal to Noise Ratio for the resulting 24-bit digital recording.

If a signal headroom greater than 18dB is desired, the operator may choose to use an XLR to mini-XLR adaptor cable with -4dB input signal pad available from RED Digital Cinema. If using this cable, again choose an **Input Level** that aligns the input signal to the right hand reference line drawn vertically through the camera's PPM, which indicates 0dBu. This setting provides a guaranteed minimum of 22dB of input signal headroom above reference and correct audio record level, however the 24-bit digital audio recording will be at a slightly reduced Signal to Noise ratio.

Note: The above notes apply to cameras configured with Rev B audio hardware. Cameras shipped prior to Sept 15 2008 (and not yet upgraded to Rev B) were supplied with Rev A audio hardware, with the following operational restrictions.

- You should always use a RED Digital Cinema XLR to mini-XLR adaptor cable, which provides a -4dB pad, to achieve an appropriate input signal level.

- The 48 V Phantom Power source is automatically disabled on each power cycle.

- Low sensitivity phantom powered microphones may exhibit excessive noise, so consider an external +48V phantom power source, or use a dynamic microphone.

- Input Level range for Microphone Inputs is +20dB to +54dB.

- Input Level for Line Level inputs may not be adjusted.

Line Output Audio
A 5-pin mini-XLR connector supports two channels of balanced analog audio output.

The camera's four audio channels may be monitored in user selectable pairs (either channels 1 & 2 or 3 & 4 or a quad mix of both pairs) based on the 'Headphone MIX' parameter.

Note: Maximum output level for the balanced analog audio outputs is +8dBu.

Pin:	Signal	Description	Direction
1	LEFT+	Line output, left channel	Out
2	GROUND	Camera Ground	-
3	LEFT-	Line output, left channel	Out
4	RIGHT+	Line output, right channel	Out
5	RIGHT-	Line output, right channel	Out

Line Output Connectors

Note: The above notes apply to cameras configured with Rev B audio hardware. Cameras shipped prior to Sept 15 2008 (and not yet upgraded to Rev B) were supplied with Rev A audio hardware, with the following operational restrictions.

- The Camera Ground connection on Pin 2 should be considered unreliable / floating.

Headphone Audio Output

A 3.5mm stereo phone jack provides two channels of adjustable level audio to headphones.

Pin:	Signal	Description	Direction
TIP	LEFT	Left channel audio	Out
RING	RIGHT	Right channel audio	Out
SLEEVE	GND	Camera ground	--

Headphone Output Connector

The camera's four audio channels may be monitored in pairs: either 1L - 2R or 3L - 4 R or a quad mix of 1+3L – 2+4R based on the MIX parameter, and the Volume adjusted as follows.

Volume: (master volume) Adjusts headphone volume equally for Left and Right outputs. Range is -18dB to 0dB in 1dB steps. Default is -9dB.

Volume Left: Trims volume for Left output. e.g. Volume –6dB + Volume Left +1dB = -5dB Range is -12dB to + 6dB in 1dB steps. Default is 0dB.

Volume Right: Trims volume for Right output. e.g. Volume –6dB + Volume Right -1dB = -7dB Range is -12dB to + 6dB in 1dB steps. Default is 0dB.

Note: The above notes apply to cameras configured with Rev B audio hardware. Cameras shipped prior to Sept 15 2008 (and not yet upgraded to Rev B) were supplied with Rev A audio hardware, with the following operational restrictions.

- For maximum output signal quality, only use high impedance headphones.

USB-2 Master

This port is currently not enabled.

USB-2 Slave

This port is currently not enabled.

Genlock Input

A single DIN 1.0/2.3 coaxial connector accepts a Tri-Level Sync signal for video genlocking.

When operating at 23.98, 24.00, 25.00 or 29.97 Project Time Bases, set the genlock signal generator to SMPTE 274 progressive scan format, at the same frame rate as the project TIME BASE. Do not use PsF or interlaced signals.

Using an Ambient ACL202CT, set dip switches as follows: D = down, U = up, R = right, L = left

Note: After changing any of the above dip switch settings, power cycle the ACL202CT unit.

Frame Rate	23.98 fps	1D, 2U, 3D, 4D, 5U, 6U, 7U, AR, BR
	24.00 fps	1D, 2U, 3U, 4D, 5U, 6U, 7U, AR, BR
	25.00 fps	1U, 2U, 3U, 4D, 5U, 6U, 7U, AR, BR
	29.97 fps	1D, 2D, 3U, 4D, 5U, 6U, 7U, AR, BR

When operating at 50.00 or 59.94 Project Time Bases, set the genlock signal generator to SMPTE 296 progressive scan format, at the same frame rate as the project TIME BASE.

Using an Ambient ACL202CT, set dip switches as follows: D= down, U = up, R = right, L = left

Frame Rate	50.00 fps	- settings not verified at this time -
	59.94 fps	1D, 2D, 3U, 4U, 5U, 6D, 7U, AR, BR

Connect the camera Genlock input to the ACL202CT VIDEO/WORD output using a BNC cable.

Pin:	Signal	Description	Direction
Center	GENLOCK	SMPTE 274M-2005 Tri-level Sync	In
Shield/Screen	GROUND	Camera ground	--

Genlock Input Signal

Program (Dual-link) HD-SDI

Two DIN 1.0/2.3 connectors labeled HD-SDI support progressive scan HD Program signals.

Pin:	Signal	Description	Direction
Center	HD-SDI	SMPTE-292M HD-SDI	Out
Shield/Screen	GROUND	Camera ground	--

Program HD-SDI Output (each connector)

In record, the Program output provides two independent outputs of 1280 x 720p 10-bit 4:2:2 progressive scan video, at 59.94 or 50.00 Hz.

In playback, if PLAYBACK is set to 720p, the Program output provides two independent outputs of 1280 x 720p 10-bit 4:2:2 progressive scan video, at 59.94 or 50.00 Hz.

If PLAYBACK is set to 1080p, the Program output provides a 1920 x 1080p 10-bit 4:4:4 RGB progressive scan video signal at 23.98, 24.00, 25.00, or 29.97 Hz.

Note: the Program HD-SDI output provides 4 channels of embedded audio plus timecode.

Note: When in Varispeed, the Program output will be blanked.

Note: RED ONE™ outputs progressive scan video, it does not support 1080PsF format.

Note: If an ANMORPHIC record mode has been selected (2K ANA, 3K ANA, 4K ANA) the video visible on the Program HD-SDI output has been stretched 2:1 to illustrate the final 2.40:1 aspect ratio of the final image projection. The actual recorded image is 1.2:1 aspect.

Preview HD-SDI

A single DIN 1.0/2.3 connector labeled PVW provides a high definition video preview output.

Pin:	Signal	Description	Direction
Center	HD-SDI	SMPTE-292M HD-SDI	Out
Shield/Screen	GROUND	Camera ground	--

Preview HD-SDI Output

Note: If PREVIEW type is set to MENUS (DVI) the PVW output is disabled.

In record, the Preview output provides a 1280 x 720p 10-bit 4:2:2 progressive scan video, at 59.94 or 50.00 Hz.

In playback, if PLAYBACK is set to 720p, the Preview output provides a 1280 x 720p 10-bit 4:2:2 progressive scan video, at 59.94 or 50.00 Hz.

If PLAYBACK is set to 1080p, the Preview output provides a 1920 x 1080p 10-bit 4:2:2 progressive scan video signal at 23.98, 24.00, 25.00, or 29.97 Hz.

Note: the Preview HD-SDI output provides 4 channels of embedded audio plus timecode.

Note: The embedded timecode value is equal to the Time Code value of the recorded frame previewed by the PVW output. I.e. the timecode sequence will be discontinuous.

Note: RED ONE™ outputs progressive scan video, it does not support 1080PsF format.

Note: If an ANMORPHIC record mode has been selected (2K ANA, 3K ANA, 4K ANA) the video visible on the Preview HD-SDI output has been stretched 2:1 to illustrate the final 2.40:1 aspect ratio of the final image projection. The actual recorded image is 1.2:1 aspect.

HDMI

An HDMI Type A connector provides an HDTV compatible 720p video and audio signal, or a DVI / SXGA compatible 1280 x 848 progressive scan video signal, at 50.00 or 59.94 Hz.

Selection between these two modes is made in SYSTEM / MONITOR / PREVIEW. The default setting is VIDEO (720p). In this mode, the HDMI output replicates the HD Preview video output.

Note: In this mode, if PLAYBACK is set to 1080p the HDMI output will provide a 1080p 10-bit 4:2:2 progressive scan video signal with 4 channel embedded audio at 23.98, 24.00, 25.00, or 29.97 Hz when the RED-ONE camera is placed into playback.

The alternative mode is MENUS (DVI). In this mode, the HDMI output is compatible with most DVI based SXGA or higher resolution computer monitors. Use is as an external Viewfinder.

Note: This mode is not compatible with PLAYBACK is set to 1080p. i.e. no output is available when the RED-ONE camera is placed into playback.

Note: If an ANMORPHIC record mode has been selected (2K ANA, 3K ANA, 4K ANA) the video visible on the HDMI output has been stretched 2:1 to illustrate the final 2.40:1 aspect ratio of the final image projection. The actual recorded image is 1.2:1 aspect.

Appendix D: Post Production

RED workflow is quite easy to understand, especially if you have had experience with photographic RAW image processing, or shoot 16mm or 35mm film followed by a telecine transfer to a non-linear video editor and on-line conform.

RAW data has a wide dynamic range and color space, so you can freely change the white balance of the footage, adjust exposure and alter highlight and shadow tonality in post-production.

The RED ONE™ camera records RAW sensor data using wavelet based REDCODE™ RAW compression to a CF card, or RED-DRIVE™ digital magazine. The compressed RAW data is then transferred from the digital media via FireWire or USB-2 to a Macintosh OSX workstation running RED Alert!™ or RED-CINE™, or to a Windows XP workstation running REDCIINE post production software. These applications do not directly edit or conform the RAW data themselves, but prepare the RAW data for editing and conforming by RGB domain post-production software applications.

If you are using CF media, copy the clips onto the workstation's hard drive. If you are recording to a RED-DRIVE, it can be directly mounted as an external drive using FireWire if desired which eliminates the media copy step.

In film processing terms, RED Alert!™ and RED-CINE™ act as an integrated film laboratory, telecine, and one light color corrector. They convert recorded REDCODE™ RAW data to RGB video, and provide basic one light image processing and color correction. Using RED-CINE™, footage can also be cropped, resized, or repositioned. These functions lessen the amount of time required for color correction or re-framing of shots after the final cut has been completed.

RED Alert!™ can generate QuickTime reference movies suitable for use in dailies applications, and export a sequence of 2K or 4K resolution RGB image files as TIFF or DPX files for DI use.

RED-CINE™ can also encode 4K or 2K RAW footage into a variety of uncompressed RGB and compressed 4:2:2 video formats. Provided the appropriate QuickTime codec's are available on the host computer workstation, compressed video choices include ProRes, DNxHD, DV100 and M-JPEG QuickTime movies at 1080p or 720p resolution. For film out, multi-media or special effects applications, RED-CINE™ may export a sequence of 2K or 4K image files in TIFF, Open EXR, DPX, JPEG, or Photoshop PSD file formats.

Creating 4:2:2 at 1080p or 720p resolution QuickTime movies provides compatibility with the majority of non-linear editing systems.

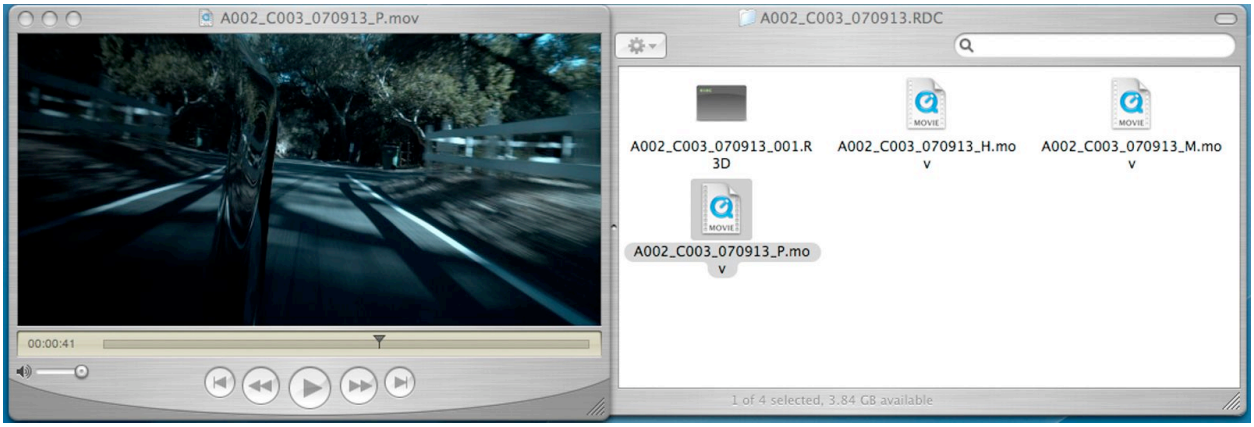
Depending on the QuickTime movie resolution, material may be taken directly to a broadcast delivery videotape format, or after the editorial decisions have been made, video can be conformed at full image resolution by replacing the lower resolution edit proxy (e.g. 720p at 8 bit quality) with a high resolution 4K, 2K or 1080p image file.

Software Tools

RED Digital Cinema provides a variety of software tools to aid postproduction. For proper color rendition using a Macintosh OSX computer, your monitor should be set to Adobe 1998, or to SMPTE-C display profile. If you use the HD Cinema display profile, adjust the gamma to 2.2.

RED QuickTime Codec (Use V3.5.0 or higher for Build 17 footage)

The RED QuickTime codec permits REDCODE™ RAW footage to be displayed on Macintosh OSX personal computers running QuickTime Player V7.4.5 or higher.



Render performance of computers will vary based on CPU speed, number of cores and disk speed. The RED ONE™ camera, RED Alert!™ and RED-CINE™ offer QuickTime reference movies at _F full, _H half, _M medium and _P proxy resolution. Choose the resolution that is most appropriate to your requirement for playback frame rate on your specific computer. If the footage is to be viewed at distant location – e.g. dailies - export the footage as a standalone movie using MPEG-4 or other low bit rate codec.

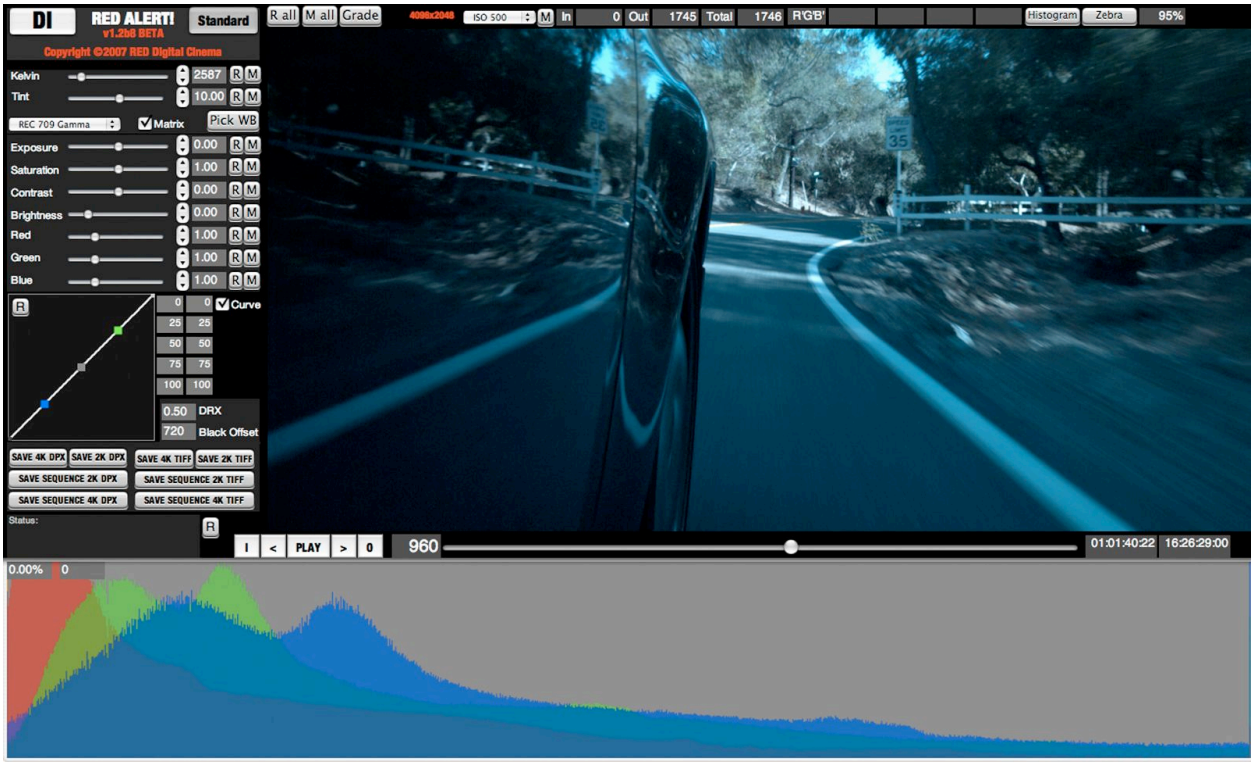
Note: The QuickTime reference movies work by partially decoding the wavelet data, which means that the original RAW recording must be available on a drive accessible to your computer. For remote use, conversion to a standalone movie avoids this issue.

RED Alert!™ **(Use V3.5.0 or higher for Build 17 footage)**

RED Alert!™ is available for Intel based Mac OSX computers only.

In addition to performing white balance and one light color correction, RED Alert!™ can export a clip at 4K and 2K resolution via 10-bit DPX or 16-bit TIFF files, or create color corrected QuickTime reference movies for editing or other uses by applications that use the RED QuickTime Codec. As RED ONE™ shoots progressive scan images, all QuickTime movies created by RED Alert!™ will also be progressive scan.

The upper panel in the display provides information about the levels in the selected clip. Exposure and White Balance may be altered, R G and B digital values may be sampled from the image, and a Zebra exposure indicator can be selected.



A composite RGB histogram is available, which appears below the main display area. This provides a view of the exposure distribution for the Red, Green and Blue channels.

A one light color correction panel permits adjustment of Color Temperature, Saturation, Contrast, Brightness, Red Gain, Green Gain and Blue Gain. These parameters match those available in the RED ONE™ camera.

Note: The range and resolution of these color correction parameters is greater than those available in the camera UI. This reflects the need for greater range and precision for the controls in post-production than for monitoring images during image capture.

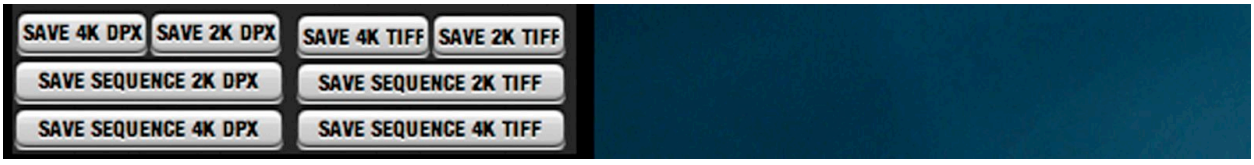
RED Alert!™ reads the metadata recorded for each color correction parameter by the RED ONE™ camera. Values can be adjusted by dragging the appropriate slider, or by entering a new numeric value in its box. Clicking R will reset the value back to its default setting. Clicking M will restore the recorded metadata value. R ALL or M ALL will affect all parameters, GRADE will revert all values back to those last used in your color grade.

Presets may be saved in RED Alert!™ that allow a consistent “look” to be established across multiple clips, or alternative color treatments may be made for the same clip.

Note: Looks may be transferred to the camera by entering RED Alert!™ values into the UI.

The image may be displayed in a variety of color spaces. For most applications, select REDspace. For special effects select Linear, and for Digital Intermediates select a Log.

The timeline control plays the selected clip and marks IN and an OUT point, between which the TIFF or DPX file sequence will be extracted. For QuickTime reference movies the entire clip will be referenced, as trimming will be performed downstream. If a single frame is to be exported, press Save 4K or 2K DPX, or 4K or 2K TIFF. If a sequence of frames is desired, press Save Sequence 4K or 2K DPX, or 4K or 2K TIFF.



RED-CINE™ (Use V3.1.2 or higher for Build 17 footage)

RED-CINE™ is available on Intel based Mac OSX and Windows XP platforms.

In addition to performing white balance and one light color correction, RED-CINE™ provides image pan/scan, crop and scaling operations. The application can export either a singe clip, or a sequence of clips, as 4K or 2K resolution 10-bit DPX or 16-bit TIFF files. RED-CINE™ can also render clips as standalone QuickTime movies using specific HD video codecs. As RED ONE™ shoots progressive scan images, all QuickTime movies created by RED-CINE™ are also progressive scan.

Tutorial video as are available at the following locations –

http://red.cachefly.net/redcine/interface_overview.mov

http://red.cachefly.net/redcine/project_settings.mov

http://red.cachefly.net/redcine/shot_settings.mov

http://red.cachefly.net/redcine/color_settings.mov

http://red.cachefly.net/redcine/output_settings.mov

http://red.cachefly.net/redcine/library.mov

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